Industrial Development Report 2018

Demand for Manufacturing: Driving Inclusive and Sustainable Industrial Development

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

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Foreword

Inclusive and sustainable industrialization is essential to achieve sustainable development. It unleashes dynamic and competitive economic forces that generate employment and income, facilitate international trade and enable efficient use of resources. As such, it is a major driver of poverty alleviation and shared prosperity.

The Industrial Development Report (IDR) series is an established source of reference on industrial development. Previous editions have been examining the driving forces of industrialization and the positive factors that can lead to social inclusiveness and environmental sustainability. They have examined crucial components of the production side of industrialization, such as capacity building, energy efficiency, employment creation and technological change, to mention just a few.

This 2018 edition of the IDR complements previous reports by shedding light on a dimension of industrial development that has still been unexplored: the consumption of manufactured goods. Understanding the consumption side is essential to fully grasp the drivers and impact of industrialization. On the one hand, industrialization cannot take place unless there is sufficient demand for new products. We thus need to understand the determinants of manufacturing consumption. On the other hand, industrial development can bring important benefits to consumers, and can thereby significantly improve their living standards and well-being. We need to better comprehend how to improve the positive impact on consumers.

This IDR, for the first time, provides a framework that captures the interactive nature of manufacturing consumption and industrial development, supported by empirical evidence. The report shows that, under the right conditions, the consumption of new products can set in motion a virtuous circle of industrial development, demand diversification and income creation.

By placing demand at the centre of attention, this year's IDR acknowledges the role of manufacturing industries as major providers of new and improved goods. Since the first industrial revolution, manufacturing has changed our lives in a radical way. Many activities of our daily lives would have been impossible to imagine without the technological breakthroughs in manufacturing—from the introduction of cars and washing machines to the distribution of computers and, more recently, smartphones and 3D printers. In all these cases, new products were first introduced to the market at high prices, affordable only for a few. But the continuous process of innovation and competition has been making them affordable for more and more households around the world.

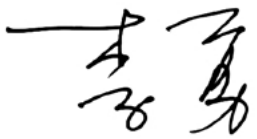
UNIDO's vision is that no one should be left behind in benefiting from industrial development and that the prosperity it creates should be shared among all people in all countries. As the report highlights, for this to happen, countries need to be involved in the process of industrialization. This requires building industrial capabilities to serve new and more sophisticated demands from consumers. Moreover, the incomes generated in the virtuous circle of consumption need to be distributed evenly across households in individual countries. An important finding of the report is that the expansion and strengthening of middle classes is a powerful driver of domestic demand for new products and industrial development.

In addition, industrial development needs to take place in an environmentally sustainable manner. Increased consumption of new products can add pressures on the environment. These pressures can be mitigated through environmental interventions in manufacturing industries that lead to the production of environmental goods: that is, goods that minimize the

use of natural resources and toxic materials, as well as the emissions of waste and pollutants. The technology for cleaner industrial production already exists, and "green industries" can be promoted to deliver environmental goods and services. A key message of the report is that the development of these industries requires major shifts in the consumption patterns towards the purchase of environmental goods. Important barriers need to be removed to allow widespread consumption, including too high prices, gaps in consumer awareness of environmental concerns and biases in purchasing behaviour.

Several policy tools that focus specifically on the demand for manufactures can support an inclusive and sustainable industrialization process. Demand can be considered as a framework condition, partially or completely outside the control of policy-makers, or as an actionable variable in industrial policy interventions. In either case, governments can assume distinct roles and actively engage with the private sector and other stakeholders, thereby acknowledging the role of the private sector as a driver of industrialization.

It is a great pleasure for me to present this report. I am delighted that *Industrial Development Report 2018* adds a consumption dimension to the analysis of industrial development. This report reaffirms the commitment of UNIDO in supporting the achievement of inclusive and sustainable industrial development. I am grateful to the UNIDO team and our international experts for producing this timely report, which displays our added value towards sustainable development.



LI Yong
Director General, UNIDO

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Technical notes and abbreviations

References to dollars ($) are to United States dollars, unless otherwise indicated.

This report classifies countries according to four primary groupings: *industrialized economies*, *emerging industrial economies, other developing economies* and *least developed countries*. The three latter groupings are together referred to as *developing and emerging industrial economies*. See Annex C1 for a complete list of countries and economies by region, industrialization level and income level.

The remaining annexes contain more detailed information about methodology and classifications. Annexes A and B provide further tables and indicators complementary to those in the text of Parts A and B of the report. Annex C contains detailed information on the classifications of economies and sectors used throughout the report. Annex D provides a guide to the origins of the data used for the figures and tables included in this report and in the series of background papers prepared for it.

In-text values in non-$ currencies are generally followed by a $-approximation, which in all cases is based on the average exchange rate for the relevant year.

Components in tables may not sum precisely to totals shown because of rounding.

CIP Competitive industrial performance
COICOP Classification of Individual Consumption According to Purpose
DVA_{MADA} Domestic value added generated by the domestic absorption of manufacturing goods
DVA_{MAFA} Domestic value added generated by the foreign absorption of manufacturing goods
DVA_{MAFID} Domestic value added generated by the final demand for manufacturing goods
FAO Food and Agriculture Organization
FDI Foreign direct investment
GDP Gross domestic product
GMP Good manufacturing practise
HS Harmonized system
ICT Information and communications technology
IDR Industrial Development Report
ILO International Labour Organization
ImWMT Share of world manufacturing trade
ImWMVA Share of world manufacturing value added
IND_{int} Industrialization intensity
ISIC International standard industrial classification
ISO International Organization for Standardization
LDC Least developed countries
MBTT Manufacturing barter terms of trade
$MHVA_{sh}$ Share of medium-high and high-tech manufacturing value added in total manufacturing value added
MHX_{sh} Share of medium- and high-tech manufactured exports in total manufactured exports
MITT Manufacturing income terms of trade
MSME Micro, small and medium enterprises
MTOE Millions of tonnes of oil equivalent
MVA Manufacturing value added
MVA_{pc} Manufacturing value added per capita
MVA_{sh} Share of manufacturing value added in total GDP

MX_{pc}	Manufactured exports per capita
MX_{sh}	Share of manufactured export in total exports
NGO	Non-governmental organization
OECD	Organisation for Economic Co-operation and Development
PPP	Purchasing power parity
R&D	Research and development
SDG	Sustainable development goal
SME	Small and medium-size enterprise
UN	United Nations
UNIDO	United Nations Industrial Development Organization
WHO	World Health Organization
WTO	World Trade Organization

Glossary

Affordable variety. Number of distinguishable manufactured goods available to consumers at prices that tend to decline relative to other sectors of the economy. Increased variety is characterized along two broad dimensions: unrelated and related. "Unrelated" refers to goods of an intrinsically different nature. "Related" refers to versions of the same product that are differentiated by quality, design or other product characteristics.

Biocapacity. Represents the ecosystems' capacity—using prevailing management schemes and extraction technologies—to regenerate the biologically productive surfaces on Earth (that is, land and water) used by people and to absorb the waste material they generate. In the National Footprint Accounts of the Global Footprint Network, "the biocapacity of an area [expressed in global hectares] is calculated by multiplying the actual physical area by the yield factor and the appropriate equivalence factor." (Global Footprint Network 2017b).

Bottom of the pyramid. The "bottom of the pyramid" is constituted by all consumers who live on less than $2 a day (Prahalad 2006).

Capital goods. Goods used in the production of other goods and services that are not completely consumed in one use.

Commodification. Persistent decline in export prices of a certain good due to standardization and increased competition in global markets. The commodification of exports is the cumulative relative price decline that a country's exporting sector faces in a specific export destination (Ghodsi and Stehrer 2017).

Commodity trap. Persistent decline in a country's barter terms of trade due to export specialization in goods that are going through a process of commodification.

Discretionary income. Portion of household income that can be allocated to other types of expenditure (other goods) once necessities are fully satisfied.

Domestic absorption. Final demand originating in the domestic economy, including private household consumption, gross capital formation and final consumption by governments and non-profit institutions.

Ecological footprint. The amount of biologically productive land and water needed by an entity—an individual, population or activity—to facilitate the production of all consumed resources and to absorb the waste generated in this process, while adopting current practices for technology and resource management. An entity's footprint is measured in global hectares. And given the global nature of trade, the footprint takes into account land and sea from all over the world (Global Footprint Network 2017b).

Elasticity. Percentage change in one variable due to one percent change in another. For example, the growth of value added, employment and labour productivity can be measured as a percentage change in these variables due to a one percent increase in gross domestic product (GDP) per capita.

Energy. The ability to do work. In industry it commonly refers to the energy used to power manufacturing processes. This report measures energy in tonnes of oil equivalent to allow comparisons of energy from various sources. Primary energy sources include biomass-based fuels (trees, branches, crop residues), fossil fuels (coal, oil, natural gas) and renewable sources (sun, wind, water). Secondary energy sources are derived from other (usually primary) energy sources and have zero pollution at the point of use (electricity, for example).

Energy efficiency. The ratio of a system's energy inputs to its outputs. In economics, energy efficiency is the ratio of the value of output to the quantity or cost of energy inputs—the amount of economic activity produced from one unit of energy.

Energy intensity. The amount of energy used to produce one unit of economic output. It is the inverse

of energy efficiency: less energy intensity means more energy efficiency. Energy intensity is measured by dividing the amount of energy used (in physical terms, millions of tonnes of oil equivalent, or mtoe) by the manufacturing value added (MVA) in monetary terms (in constant 2010 $). The energy intensity of manufacturing is the amount of energy used to produce one unit of value added.

Engel curve. Graphical representation of the relationship between household income and the share of expenditures allocated to one specific consumption item.

Engel's law. Economic regularity stating that the budget share dedicated to food declines as household income increases (Engel 1895, Houthakker 1957).

Environmental goods. Goods that meet basic needs or improve the quality of life while minimizing the use of natural resources (including toxic materials) and the emissions of waste and pollutants over the product's life cycle, in order to avoid jeopardizing the quality of life of future generations.

Externalities. Costs or benefits that accrue to unrelated third parties. When it is a benefit reaped by third parties, it is called a "positive" externality. When it is a cost imposed on third parties, it is called a "negative" externality. An externality is a market failure that provides a rationale for industrial policy (UNIDO 2011a).

Global value chain. The value chain describes the full range of activities that firms and workers do to bring a product from its conception to its end use and beyond. This includes activities such as design, production, marketing, distribution and support to the final consumer. The activities that comprise a value chain can be contained within a single firm or divided among different firms (Gereffi and Fernandez-Stark 2011). When firms are located in different economies, the value chain is considered "global."

Green public procurement. The purchase of works, goods and services by public authorities from companies within sectors such as energy, transport, and waste management, as well as health and education (European Commission 2017a), is referred to as public procurement (European Commission 2017b). By choosing environmentally friendly works, goods and services, also known as green purchasing or green public procurement, governments contribute to sustainable consumption and production.

Inclusive and sustainable industrial development. Inclusive and sustainable industrial development highlights the role of long-term (or sustained) industrialization as a driver for development and includes three different aspects: creating shared prosperity (offering equal opportunities and an equitable distribution of benefits to all), advancing economic competitiveness and safeguarding the environment (addressing the need to decouple generated prosperity of industrial activities from excessive natural use and negative environmental impacts). The Lima Declaration, adopted by UNIDO's Member States on 2 December 2013, set the foundation for this vision (UNIDO 2015e).

Income elasticity of demand. Reflects the percentage increase in the consumption of a product due to a one percent increase in income. Inferior goods have a negative elasticity (demand decreases with rising income), necessities have an elasticity between 0 and 1 and superior goods have an elasticity higher than 1 (demand increases with rising income).

Incremental innovation. Significant enhancement or improvement in the performance of an existing product, service, process, organization or method (OECD and World Bank n.d.).

Industrial policy. Any type of intervention or government policy that attempts to improve the business environment or to alter the structure of economic activity towards sectors, technologies or tasks that are expected to offer better prospects for economic growth or societal welfare than would occur in the absence of such intervention—that is, in a market equilibrium (Warwick 2013).

Informal economy. Portion of the economy that is operated outside the purview of government and

thus is not taxed or included in statistics (UNIDO 2013).

Innovation. Implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations (OECD and Eurostat 2005).

Intensive and extensive margins. Export expansion, in terms of either products or destinations, can be at the intensive or extensive margins. Intensive margins refer to growth in the value of existing exports to the same destination(s). Extensive margins refer to new export items or new destinations (UN and WTO 2012).

Intermediate goods. Goods used as inputs in the production of other goods and services which are completely consumed in one use (UNIDO 2013).

Leakages. Fraction of a change in national income that is not spent on current domestic production but is instead saved, paid in taxes or spent on imports (Mayer 2016).

Manufacturing barter terms of trade (MBTT). Ratio of a country's exports price to its imports price of manufacturing goods.

Manufacturing export unit value. Ratio of the export value of a product to its weight. Commonly used as a proxy for export prices.

Manufacturing income terms of trade (MITT). Ratio of a country's exports value to its imports price of manufacturing goods. Indicates the purchasing power of manufacturing exports (in terms of how much a country can import per unit of its exports).

Manufacturing value added (MVA). *See value added.*

Massification (of manufacturing consumer goods). Process by which the consumption of a good is broadly diffused across households. Mass consumption implies that the majority of families can enjoy the benefits of increased productivity and constantly expand their range of consumer goods (Matsuyama 2002).

Price effect. The income gains stemming from improved purchasing power of consumers due to the decline in the relative prices of manufacturing goods.

Process innovation. Implementation of new or significantly improved production or delivery methods, including significant changes in techniques, equipment or software (OECD and Eurostat 2005).

Product differentiation. Vertical differentiation refers to product characteristics that all consumers would agree are valuable and thus constitute quality attributes. Horizontal differentiation refers to product characteristics considered desirable only by some but not all consumers (OECD 2013).

Product innovation. The introduction of goods or services that are new or significantly improved in their characteristics or intended uses (OECD and Eurostat 2005).

Public–private partnership. While a universally accepted definition does not exist, a public–private partnership is often understood as a long-term contractual partnership between a government agency (federal, state or local) and a private sector company. The partnership is often used to fund public services and infrastructure projects—such as telecommunication systems, public transportation networks, parks, airports and power plants—that otherwise would have been delivered through traditional public sector procurement. *See green public procurement.*

Purchasing power parity (PPP). A concept that determines the relative values of two currencies' purchasing power. PPP-based GDP shows what goods and services produced in one country would cost if they were sold in the United States. Since non-tradable services of similar quality are priced lower in low-income countries than they are in the United States, their PPP-based GDPs usually become higher than their GDPs based on market exchange rates.

Radical innovation. Innovation that has a significant impact on a market and on the economic activity of firms in that market (OECD and World Bank n.d.).

Research and experimental development (R&D). R&D comprise creative work undertaken on a

systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications. The term R&D covers three activities: basic research, applied research and experimental development (OECD 2002).

Resource efficiency. Use of the Earth's limited resources in a sustainable manner while minimizing impacts on the environment (European Commission 2017d).

Satiation. The satiation level describes the upper limit of household expenditure on any particular good. Once the limit is reached, household expenditure will cease to rise in response to increasing income (Pasinetti 1981).

Structural change. Change in the long-term composition and distribution of economic activities. A normative perspective of structural change often emphasizes desirability in the direction of change. For example, Ocampo (2005), Ocampo and Vos (2008) and UNDESA (2006) define structural change as the ability of an economy to continually generate new dynamic activities characterized by higher productivity and increasing returns to scale.

Technological change. Improvements in technology. Technological change involves a series of stages with multiple actors, relationships and feedback loops—from invention, as a new technology is created and prototyped, to innovation, as it becomes commercially viable (UNIDO 2011a).

Total factor productivity. The amount of output not accounted for by the amount of factor inputs, such as labour and capital (UNIDO 2013).

Unit labour costs. Cost of labour per unit of output. It is calculated as the ratio of labour costs to real output (UNIDO 2013).

Value added. A measure of output net of intermediate consumption, which includes the value of materials and supplies used in production, fuels and electricity consumed, the cost of industrial services such as payments for contract and commission work and repair and maintenance, compensation of employees, operating surplus and consumption of fixed capital. *Manufacturing valued added* is the contribution of the entire manufacturing sector to GDP (manufacturing net output) (UNIDO 2013).

Variety effect. The income gains stemming from the emergence of new industrial sectors due to the diversification of demand. When demand diversifies away from necessities into other "superior" goods, it creates new opportunities for the emergence of new industries, which generates new income for workers and entrepreneurs directly and indirectly involved in their production.

Virtuous circle of manufacturing consumption. In this report, the virtuous circle of manufacturing consumption describes how an increase in discretionary incomes sets in motion a series of interrelated effects that foster income gains and welfare through the consumption and production of manufacturing goods. First, demand diversifies from necessities into other "superior" goods, creating new opportunities for the emergence of new industries ("variety effect"). Second, the new industries consolidate, improve production efficiency and reduce prices, enabling the mass consumption of their products. This creates new opportunities for income creation as the size of production expands ("volume effect"). Third, interfirm competition and innovations lead to further reduction in prices in the mass consumption products, augmenting the purchasing power of all consumers ("price effect") and keeping the circle turning.

Volume effect. The income gains stemming from the consolidation of industrial sectors due to the massification of consumption. Mass consumption generates new opportunities for income creation as the size of production expands.

Overview
Demand for manufacturing: Driving inclusive and sustainable industrial development

Key messages

Spinning the "virtuous circle"

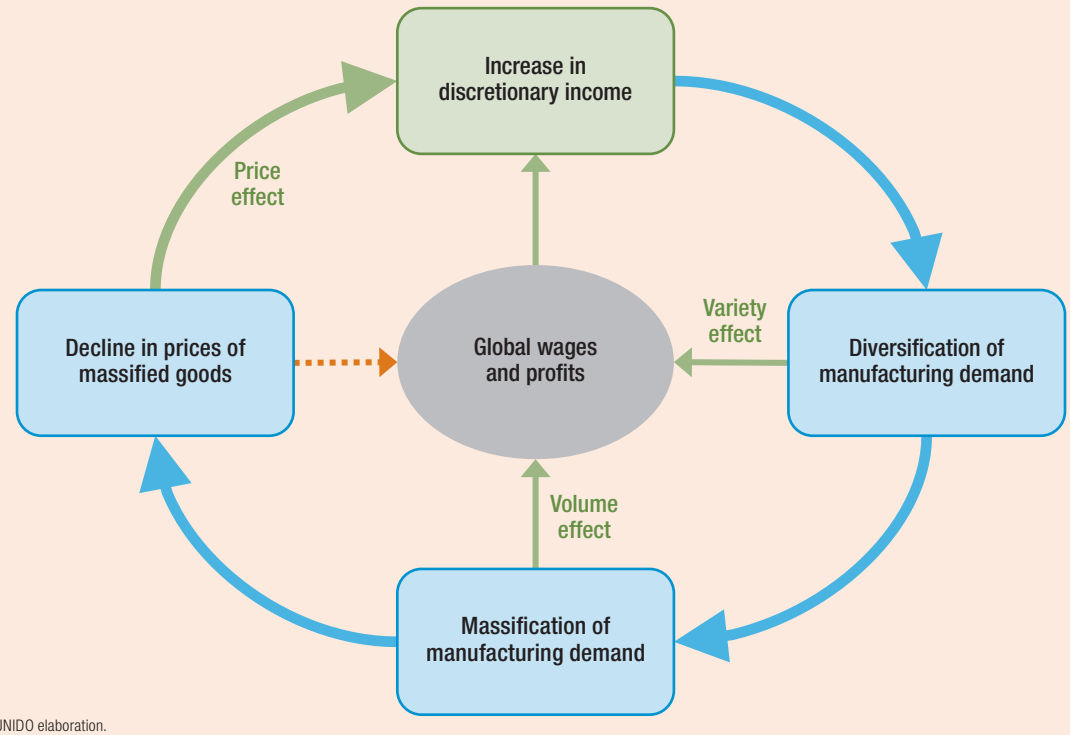
Industrial development has typically been studied from a supply-side perspective, ignoring the importance of demand. The initiation of industrial development, however, requires a critical mass of demand for manufactures. With the right set of conditions, the consumption of manufactures can set in motion a virtuous circle of industrial development comprising income creation, demand diversification and massification of consumption (Figure 1).

Initially, as income grows, demand shifts from necessities to more sophisticated goods. If enough industrial capabilities are in place, this diversification can be a powerful driver of industrial development through the emergence of new industries. The expansion and consolidation of manufacturing industries, in turn, lead to increases in production efficiency and reduction in prices, which enable a broad-based diffusion of manufactures through mass markets. Further increases in production efficiency improve the purchasing power of all consumers, which create new disposable incomes—and keep the circle turning. Around this circle, industries emerge and disappear, and new sources of income are created for consumers, workers and entrepreneurs.

Capturing income from domestic and foreign demand

For the virtuous circle to work, a critical mass of income needs to be generated within individual economies—and this income should be well distributed. Gains going to the top 1 percent will not keep the circle virtuous.

Figure 1
A virtuous circle of manufacturing consumption and industrial development



Source: UNIDO elaboration.

“Studying manufacturing from the perspective of demand offers a more empirically grounded understanding of the sector’s evolution and current state

In a globalized economy the income generated depends on who serves the final demand for manufactures and how. To benefit from the circle, countries need to capture income from both domestic and foreign demand.

Another critical mass—of industrial capabilities—needs to be reached so that domestic producers can serve increasingly sophisticated demand from consumers, nationally and globally. The upshot? Prices for new varieties of manufactures decline as production efficiency increases.

Distributing the gains inclusively and pro-environmentally

The circle of consumption does not guarantee socially inclusive and sustainable outcomes. Such inclusiveness—equal opportunities to contribute and benefit from industrialization—requires that income flow to the poorest in society, increasing welfare at the “bottom of the pyramid.”

Increased consumption also intensifies environmental impacts, through higher pollution, overuse of natural resources and creation of waste. Technological innovations and “massified” environmental goods are key to addressing this challenge and rendering the virtuous circle environmentally sustainable.

Meeting the Sustainable Development Goals

The emergence and diversification of mass markets for manufactured products incentivize a process of continuous innovation. They also call forth the provision of infrastructure, from improved transport links to optical fibres, to better serve these mass markets. New industrial sectors emerge and expand, generating new jobs and profit opportunities. If it is made inclusive and sustainable, the circle is an important catalyst for achieving Sustainable Development Goal (SDG) 9 (“Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation”). At the same time, industrial development improves the welfare of consumers by providing new varieties and qualities of goods that become affordable to everyone, potentially helping achieve other SDGs.

What governments can do

Governments can encounter demand as a “framework condition” (about which they can do little) or as a “policy-actionable variable” through which they can help exploit the opportunities created by manufacturing demand to drive industrial development, making this process socially inclusive by shifting incomes towards the poorer segments of society and environmentally sustainable by encouraging massification in the consumption of environmental goods.

A new perspective: Demand

The traditional approach to studying industrial development has ignored demand

Industrial development has been studied largely from the production side, with little focus on demand variables or their interaction with supply. If they are to diffuse successfully, new or better products must meet consumer demand.

Policies and the academic literature emphasize the productive assets needed for industrial development—including entrepreneurial and technological capabilities, labour skills, quality of resources and good infrastructure—neglecting demand-side variables and policy tools. This report seeks to plug this gap. How does industrial development improve living standards (Chapter 1)? How does demand drive industrialization, nationally and globally (Chapters 2–4)? How can consumption be made sustainable (Chapter 5)? What can governments do to harness shifts in demand patterns (Chapter 6)? How are these trends reflected in production patterns and competitive performance across regions of the world (Chapters 7–8)? Studying manufacturing from the perspective of demand offers a more empirically grounded understanding of the sector’s evolution and current state.

Bringing affordable variety for all

Manufacturing is not losing its significance

Recent global trends have led some observers to (erroneously) conclude that manufacturing is no longer a key sector of the economy. A popularly held view is

“What matters for consumers is the creation of new manufactures that become better and cheaper over time

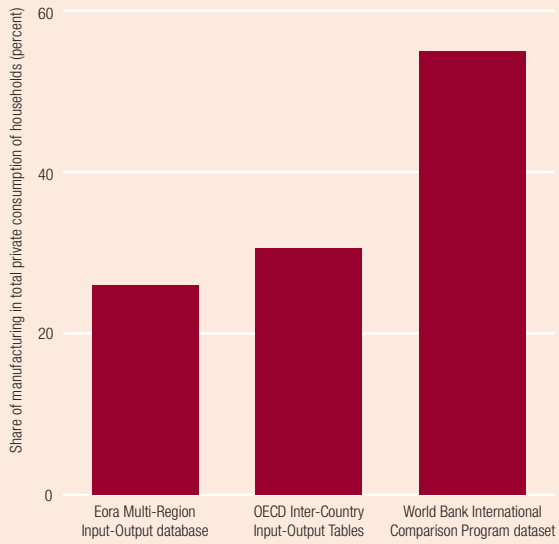
that manufacturing’s importance has been shrinking over the last few decades, in line with the emergence of the “post-industrial” society. The empirical evidence used to substantiate this claim is typically based on the nominal value added produced in manufacturing industries as a share of nominal gross domestic product (GDP). At first glance, both at the global level and among specific country groups, the value of manufacturing production has declined relative to other sectors, suggesting a process of deindustrialization.

This conclusion, however, is driven by the production angle. When demand is placed at the centre of attention, other features become as important. What matters for consumers is not the share of manufacturing in nominal GDP but the creation of new manufactures that become better and cheaper over time. The empirical evidence presented in this report highlights the importance of manufacturing in providing an increasing variety of goods at prices that decline relative to those in other sectors of the economy—providing “affordable variety for all.”

From a consumer perspective, the importance of manufacturing has increased over the past 25 years

One way of analysing the importance of manufacturing from the consumer angle is to look at its share in GDP when prices are kept constant, to provide an indication of changes in the quantities of goods manufactured. From this perspective, the sector’s contribution to real GDP increased over the past 25 years. When one looks at the share of manufacturing keeping prices constant at the 2010 level, there is no evidence of global deindustrialization. On the contrary, between 1991 and 2014 the share of manufacturing in real GDP increased, from 14.8 to 16.0 percent (see Chapter 1, Figure 1.5).

Figure 2
Manufacturing: A key provider of goods for private household consumption



Note: All values are for 2011 and in current $. Values are unweighted averages of all countries included in each source. In the World Bank International Comparison Program dataset, manufacturing consumption is defined following the approach put forth in Duarte (2017) (see Annex C4, Table C4.1).
Source: UNIDO elaboration based on the Eora Multi-Region Input-Output database (Lenzen et al. 2012; Lenzen et al. 2013), OECD (2017c) “Inter-Country Input-Output Tables, 2016 edition,” oe.cd/icio, (accessed on September 6, 2017) and the 2011 International Comparison Program dataset (World Bank 2015).

Manufacturing accounts for the bulk of consumption expenditures…

The importance of manufacturing from a demand perspective is not confined to its share of GDP. It also plays a key role as a provider of goods, a point that stands out clearly in final consumption statistics. Most of the items people consume daily are produced by manufacturing. As data from household expenditure surveys reveal, on average more than half of the world’s consumption spending goes to manufactured goods (Figure 2).[1]

1. The first and second bars in the figure are based on national account statistics, while the third bar is based on household expenditure surveys. That explains the large differences between sources. National accounts-based statistics include an imputation for the “consumption” of household services that is not present in expenditure surveys and hence reduces the share of manufacturing goods. Differences also exist in the sectoral disaggregation used. National accounts use industry-based classification while household surveys use consumption specific classifications. In the latter the definition of manufacturing is not straightforward and does not match exactly with the industry-based classification. This report uses a classification put forward in Duarte (2017).

> **Interactions between demand and supply enable the diffusion of new, better and ever cheaper goods for consumers**

…and consumption is a major driver of industrial development

Industrial development does not occur in a vacuum. It can take place only if there is sufficient demand for manufactured goods. Consumers thus play a key role in the emergence and consolidation of manufacturing sectors. Domestic consumption is a key component of demand, but external demand—through exports—is also important for industrial development.

Interactions between demand and supply

Industrial development, demand diversification and income creation interact strongly

For a new manufactured good to be introduced to the market, demand is needed. A high initial price and few applications render a good accessible only to high-income households. As the sector consolidates and gains scale, prices fall, making the good affordable to more consumers. With enough demand in place, the good becomes mass consumed—"massified"—allowing for further exploitation of scale economies, the entry of new firms, greater competition and further declines in prices. This interactive process between demand and supply enables the diffusion of new, better and ever cheaper goods for consumers alongside the expansion and development of new sectors and related providers.

Computers and other goods exemplify these interactions

When introduced, computers were so large and expensive that almost no individual could afford one. Only after the invention of the micro-processor in the 1970s could computers become "personal." They still remained a niche market, however. By the 1990s, after two decades of rapid technological progress, continual quality improvements and declining production costs, computers had become essential tools at home and work. Similar trajectories are seen in the life cycle of other manufacturing durables, such as washing machines, cars, telephones and televisions.

Technology strengthens the interactions between demand and supply

In this interplay of demand and supply, innovation is not limited to creating new products and improving existing ones. Innovation is also required to reduce transactions costs, enabling producers to reach their target markets. Improved airfreight, shipping containers and modularity are a few of the innovations that accelerated the flow of goods to markets in the past, helping their diffusion. Today, information and communication technologies (ICTs) allow firms to tap into previously inaccessible sources of demand by establishing an instantaneous connection with consumers.

The virtuous circle of industrial development: Creating income, diversifying demand and massifying consumption

The relationship between consumer demand and industrial development

As incomes grow, demand diversifies away from necessities towards other goods and services

Shifts in consumption patterns and shifts in the composition of the economy are inter-dependent. As income rises, the budget share households allocate to necessities and basic goods declines—a relationship known as Engel's Law (Figure 3). Demand shifts from food and other necessities towards increasingly sophisticated products and services, providing new opportunities for sectors to emerge.

Some goods are luxuries, others necessities

Not all manufactured goods respond to changes in income in the same way. Demand for some goods increases more than proportionally as income rises; they are known as "superior" or "luxury" goods. Demand for other goods increases less than proportionally; they are known as "inferior" goods or necessities.

Income elasticities—the change in consumption that occurs when income rises by 1 percent—illustrate this distinction. Products such as cars, motorcycles and jewellery are typically classified as superior goods,

> **A salient feature of successful manufactures is their broad-based diffusion across households and global regions**

Figure 3
The share of household spending on food declines as income rises

Note: All values are for 2011. GDP is gross domestic product and PPP is purchasing power parity. Classification of food and non-alcoholic beverages consumption is based on Annex C4, Table C4.1.
Source: UNIDO elaboration based on the 2011 International Comparison Program dataset (World Bank 2015) and World Development Indicators (World Bank 2017b).

because their elasticity tends to be greater than 1. In contrast, pharmaceuticals, clothing and footwear can be considered necessities, because their average elasticity is less than 1 (Figure 2.5).

Whether a good is a luxury or a necessity varies by income levels of countries and over time

The response of different manufactured goods to changes in income depends on consumers' location and socioeconomic status; it also changes over time, reflecting different stages of the life cycle of manufactures. Within a country, the same product can be a luxury for the lowest-income segment and a necessity for the highest-income segment (Figure 2.6). Over time, goods introduced at high prices and accessible only by high-income households can become necessities, as innovations reduce their prices and broaden their applications.

Demand massifies when luxury goods accessible only to a few households turn into necessities and are consumed by all

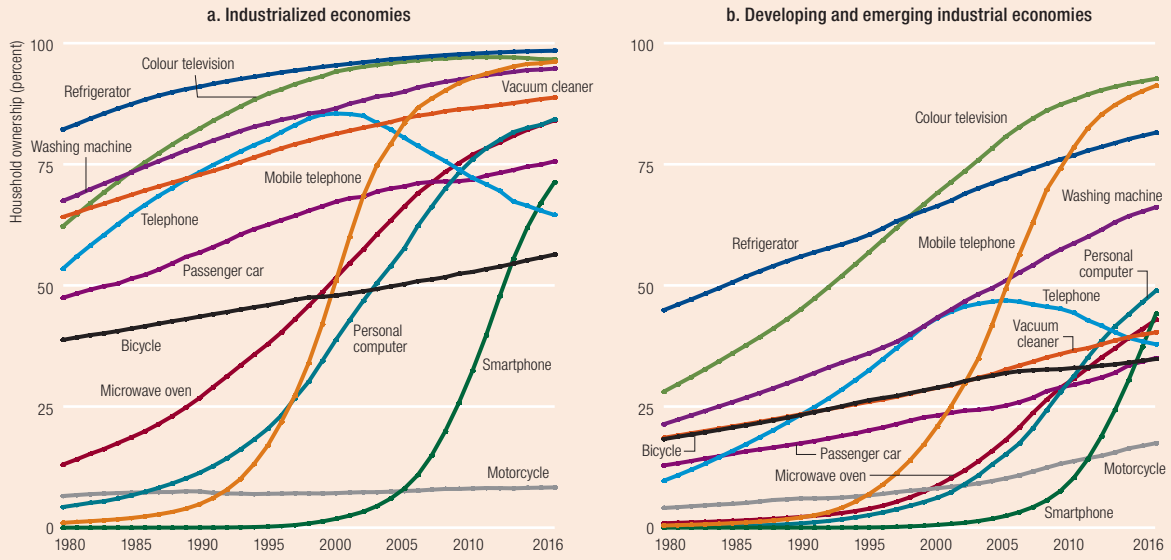
When luxuries turn into necessities that the vast majority of households can afford, they are said to "massify." A salient feature of successful manufactures is their broad-based diffusion across households and global regions (Figure 4). The diffusion of most goods follows the traditional S-shaped pattern: At first, only a few individuals adopt the new good, but soon diffusion begins to climb, as more and more households adopt it. The rate of adoption then begins to level off, as fewer and fewer households remain that have not adopted the product. Eventually, the S-shaped curve reaches its asymptote. The good has become a mass product.

After a certain point, demand tends to satiate, driving structural change

An important feature of demand is the tendency to satiate—to reach the point at which household expenditure ceases to rise in response to increases in income. Satiation is crucial in driving structural change from the demand side. The slowdown in demand growth causes resources to shift from sectors supplying goods for which demand has satiated towards new sectors that produce goods for which demand has not yet been satiated.

> **Central to the process of demand diversification and massification is the growth of the manufacturing sector**

Figure 4
Over the past decades, household consumption of durable manufacturing goods has spread at an increasing rate around the world



Note: Industrialization level classification is based on Annex C1, Table C1.2.
Source: UNIDO elaboration based on Euromonitor International (Economies and Consumers; Possession of Household Durables, 2016).

Why industrial development is important

Industrial development plays a key role as a prime provider of new goods

Central to the process of demand diversification and massification is the growth of the manufacturing sector. Manufacturing firms are the key providers of new goods and increased variety within any economy. People's daily lives have been radically transformed by successive waves of technological revolutions, all initiated in the industrial sector. These waves significantly increased the set of goods available for consumers—and continue to do so today.

Thanks to advances in productivity, competition and innovation, these goods tend to become less and less expensive…

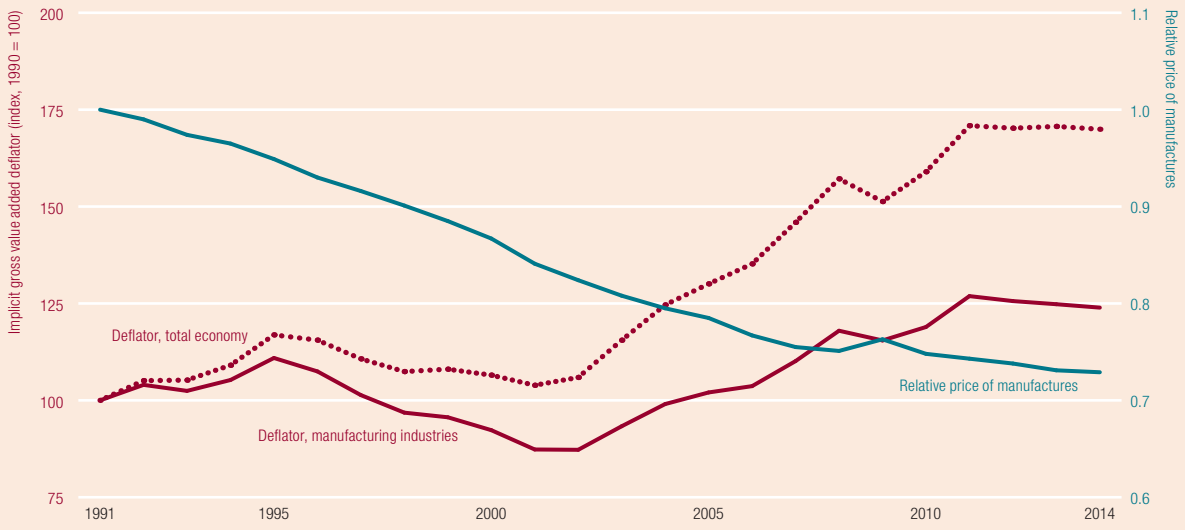
Underlying all industrial revolutions, from the first until today's fourth, is a process of continuous price reduction, enabled by productivity gains, product and process innovation and competition in product markets. Output prices in manufacturing display a systematic downward trend relative to prices in all other sectors in the economy, fundamentally influencing the weight of manufacturing in national accounts. As a result, the sector is on the decline in nominal terms but not in real terms. The tendency towards falling relative prices lies at the heart of the industrial sector and reflects its inherently higher potential for productivity growth relative to agriculture or services. Continuous increases in productivity are passed on to consumers in the form of lower prices, stimulating further demand and allowing firms to invest in expanding production and employment (Figure 5).

…and can therefore be massively consumed

As a result of the fall in prices, demand for manufactures massifies. Technological innovation and mass production are therefore intertwined. Process innovations reduce production costs, enabling producers to tap into mass consumption markets. Mass production facilitates further process innovations by increasing learning-by-doing and specialization benefits. There is an iterative causality between productivity

"As income grows, discretionary income leads to demand for new products, which spurs manufacturing firms to engage in production

Figure 5
Relative price of manufacturing in decline compared with the global economy



Note: Implicit gross value added deflator is calculated as the ratio between world value added at current prices and at constant prices of 2010. The relative price of manufactures is calculated as the relationship between the deflator of manufacturing industries and the total economy.
Source: UNIDO elaboration based on the Manufacturing Value Added 2017 database (UNIDO 2017f).

improvements in manufacturing and the rise of a mass consumption society: As productivity improves, the price of consumer goods falls, generating larger markets, inducing further improvements in productivity and creating a virtuous circle of productivity gains and expanding markets.

This causality can be illustrated as a virtuous circle

An increase in the discretionary income at the disposal of consumers—thanks to lower prices and increased earnings—sets in motion a series of interrelated effects that foster income gains and welfare through the consumption and production of manufactured goods (Figure 6). Along the circle new sources of income are created for consumers, workers and entrepreneurs.[2]

Until the end of the 19th century, most people allocated the largest share of their income to necessities. The acquisition of more sophisticated goods and services required discretionary income. Only with the greater efficiency of production brought about by the first industrial revolution could ordinary people start to accumulate income beyond what was necessary for basic sustenance. Improved efficiency, with the increasing income created by new sectors from investment and wages, explains the creation of discretionary income, which leads to the process of growing product quality and differentiation. How does the circle work?

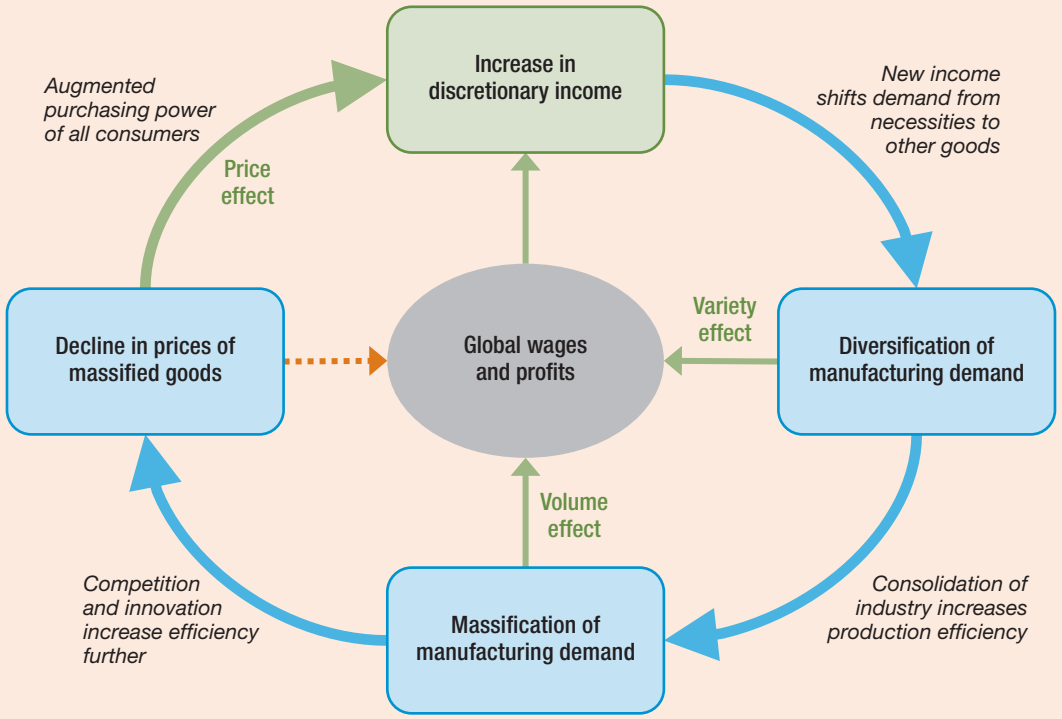
Increases in discretionary income lead to demand diversification and the creation of new industries that provide a greater variety of products

An increase in discretionary income leads to diversification of demand away from necessities towards other goods, creating new opportunities for the emergence of new sectors. As income grows, necessities are more easily satisfied, and part of the new income—discretionary income—is allocated to other types of expenditure. When demand for a new product increases to a sufficient scale, it spurs manufacturing firms to engage in production of the product. Investment shifts towards the emerging sectors,

2. The conceptual underpinnings of this circle are rooted in well-established contributions from the specialized literature including Foellmi et al. (2014), Kaldor (1967), Matsuyama (2002) and Saviotti and Pyka (2013).

> **“With firms now able to pass productivity increases on to consumers, luxuries turn into necessities affordable by yet more households**

Figure 6
The virtuous circle of manufacturing consumption: The global economy



Source: UNIDO elaboration.

increasing variety in the economy and improving the nominal income of those workers and entrepreneurs directly and indirectly involved in the new production (the “variety effect”).

Increased production efficiency in new industries reduces prices and enables demand massification, opening new opportunities for producers

As emerging manufacturing industries consolidate, they gain scale and increase efficiency, through process and managerial innovations. Manufacturing industries appear to grow in a cumulative fashion: The continuous expansion of production leads to further improvements in efficiency, reflecting learning dynamics. This expansion accelerates the growth of productivity within the sector and the economy as whole. When productivity increases as a result of economies of scale, as well as advances in technology and organization, production costs decrease, reducing the prices of goods that had once been affordable only by a few. With firms now able to pass productivity increases on to consumers in the form of lower prices, luxuries turn into necessities affordable by yet more households. Demand for these products becomes massive, and new income opportunities are created for firms serving the new sources of demand (the “volume effect”).

Further increases in production efficiency reduce prices even more, increasing the purchasing power of all consumers and lifting discretionary incomes

The process of production efficiency gains does not stop there. Even when goods have diffused among all consumers, inter-firm competition, alongside the constant introduction of innovations, leads to further gains in production efficiency and price declines. This reduction in prices now affects the vast majority of consumers, including the early and late adopters of the new goods. The purchasing power of all consumers

> **“Affordable variety contributes to increasing consumer welfare across all segments of society**

increases (the “price effect”), as does the discretionary income they can allocate to new varieties of non-essential manufactured goods, restarting the circle once again. It is this process of continuous diversification of demand over time that gives impetus to the emergence of new industries and the creation of new varieties of goods—a key requirement for sustaining economic development over the long term.

How consumers benefit from the virtuous circle

Affordable variety and consumer welfare

Manufacturing creates affordable variety for all and helps create the income needed to purchase these items

The most visible result of the virtuous circle is that a continuous stream of products—some radically new and initially expensive, others increasingly affordable improvements on previous innovations—reaches the vast majority of consumers. New goods and a greater variety of products transform the physical environment, as well as habits and social relations. New income is generated via direct and indirect channels, through the combined effects of greater variety and volume and the decline in relative prices. Affordable variety contributes to increasing consumer welfare across all segments of society.

Cheaper and better goods improve consumers’ welfare…

The introduction of a new good can be considered an important source of consumer welfare. The polio vaccine, frozen food and personal computers are a few examples of new goods that raised life expectancy and productivity. The decline in prices and improvement in quality of these goods constitute major sources of welfare for consumers. Subject to technological progress in industry, prices for consumer goods have experienced a long-term downward trend over the past century that has contributed to an unprecedented improvement in consumers’ purchasing power and welfare.

…and broaden their set of choices, creating more variety in the economy

Closely related to welfare gains from new goods and price reductions is the increase in variety. Recent research finds that access to a wider variety of imports increased consumer welfare by 2.2–2.6 percent of real income in the United States between 1970 and 2000 (Broda and Weinstein 2006).

Affordable variety and the Sustainable Development Goals

Affordable variety helps countries achieve SDG 9 (“Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation”)

Welfare is not limited to the mere expansion of consumption options. The virtuous circle is also a critical underpinning for attaining inclusive and sustainable industrial development, particularly SDG 9. The diversification of consumer preferences drives industrial development. When preferences steer away from the consumption of goods that are damaging to the environment or society, industrialization leads to greater inclusivity and sustainability. Acting directly on consumers, industrial development can contribute to achieving other SDGs.

Affordability supports poverty alleviation

Falling relative prices for consumer goods can contribute to poverty reduction. The channel towards poverty reduction is reinforced when product and process innovations are designed to address lower income segments of society. Innovations that redesign products and delivery systems to adapt them to the needs of low-income communities can increase the welfare of the poor. Examples range from the introduction of environmentally sound sanitation technology in traditionally neglected areas of India to the provision of affordable computers to rural residents in China.

New and affordable food products contribute to food security

The price channel is also one of the fundamental determinants of equitable access to safe and

> **Global demand can be a powerful source of income generation**

sustainable food for consumption. As long as competition exists in product markets, increased variety will bring down prices, increasing access. The reduction in prices for agricultural products may also occur as a result of the productivity increases in the rural sector that accompany technological changes in manufacturing. Agricultural machinery and fertilizers, for example, bring huge benefits to consumers, contributing to food security.

New and affordable medicines work towards ensuring healthy lives

The production of affordable, quality-assured generic medicines in low- and middle-income countries can increase equitable access for all consumers. In such countries barriers to access to essential medicines that are safe to use can be onerous. Public health facilities sometimes provide generic medicines for free or at a very low cost, but availability is often low and quality difficult to assess. If pharmaceutical firms adhere to good manufacturing practices, local production can provide quality-assured medicines at affordable prices.

New and affordable household consumption durables support the achievement of gender equality

Affordable variety can also help narrow gender disparities. The widespread diffusion of household appliances increases the opportunity cost associated with spending time on unpaid home-based activities, which women are generally expected to take on. The time released can be spent on market-oriented activities. Evidence that labour-saving technology may influence the distribution of unpaid housework within the household, however, remains ambiguous.

Income creation and access to affordable variety

At the country level, access to affordable variety requires a critical mass of income

Access to affordable consumer products has major implications for consumer welfare but requires enough incomes to be created. A key aspect of the virtuous circle is that demand diversification, as well as price, variety and volume effects, help generate this critical mass of incomes. At the global level, the incomes generated feed back into the circle as increased (global) demand. The world at large benefits—regardless of where production and consumption take place.

In a globalized economy, demand and production are not necessarily in the same place

For open economies in a globalized world, however, mechanisms can leak (or inject) new sources of income and demand outside (or within) the domestic economy. Growing domestic demand for a product can, for instance, be satisfied entirely by imports in countries with few industrial capabilities, hampering the workings of the virtuous circle. Figure 7 shows the possible mechanisms through which demand may leak or be injected in an individual economy.

Income generation depends on who serves final demand and how

In open economies, when new or existing varieties of goods are imported for domestic consumption, domestic demand leaks towards foreign production. A decline in the prices at which domestically produced goods are exported reduces nominal incomes in the domestic economy (see the red dashed lines in Figure 7). But global demand can also be a powerful source of income generation. It can take the form of injections of demand or increases in the purchasing power of domestic consumers thanks to imports of cheaper goods from abroad (see the green solid lines in Figure 7).

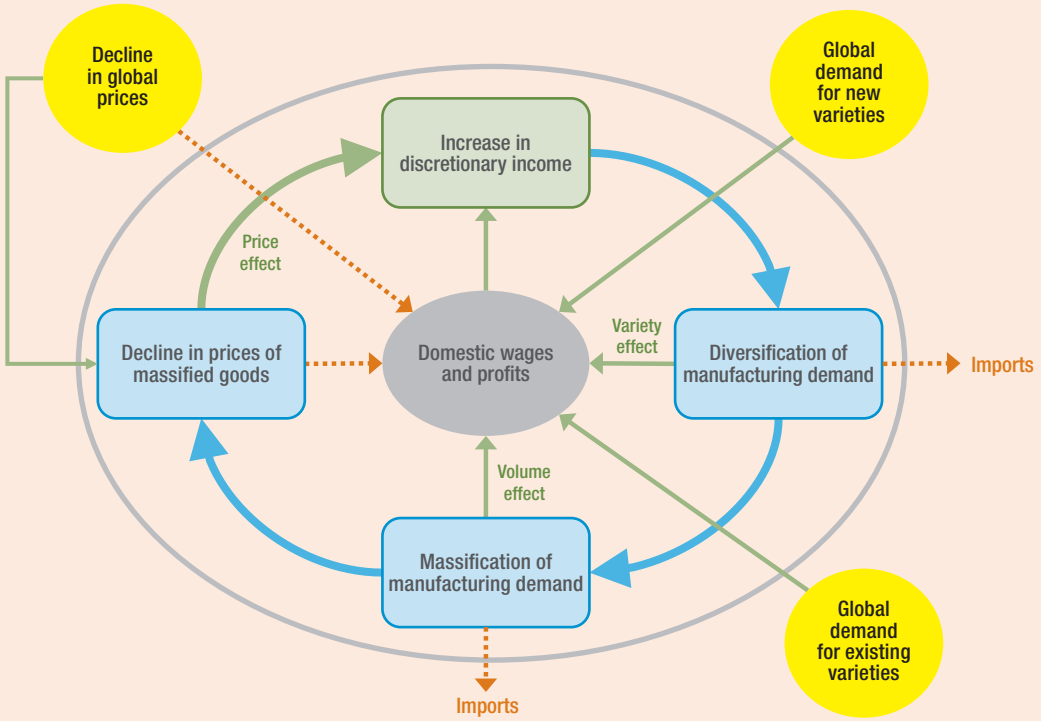
Capturing income from demand

Demand is split into two sources, domestic and foreign

Initiating and sustaining the virtuous circle requires an increase in demand for locally produced manufactured goods. This demand can be either of domestic or foreign origin. To foster industrialization, policymakers need to consider the attributes of each.

“Industrialized economies generally rely the most on foreign demand, and least developed countries on domestic demand

Figure 7
The virtuous circle of manufacturing consumption: The domestic economy



Source: UNIDO elaboration.

Domestic demand

Domestic demand is the most important component, especially in developing countries

Domestic absorption (the sum of private household consumption, gross capital formation and final consumption by government and non-profit institutions) is the main driver of final demand for manufacturing —at the world level and across countries at different stages of industrial development (Figure 8).

Differences exist, however, across the world's four country groups (industrialized economies, emerging industrial economies, other developing economies, and least developed countries). Industrialized economies generally rely the most on foreign demand, although even in these countries, domestic absorption remains by far the largest component (accounting for about two-thirds of the total). Least developed countries show the greatest reliance on domestic demand (about 90 percent).

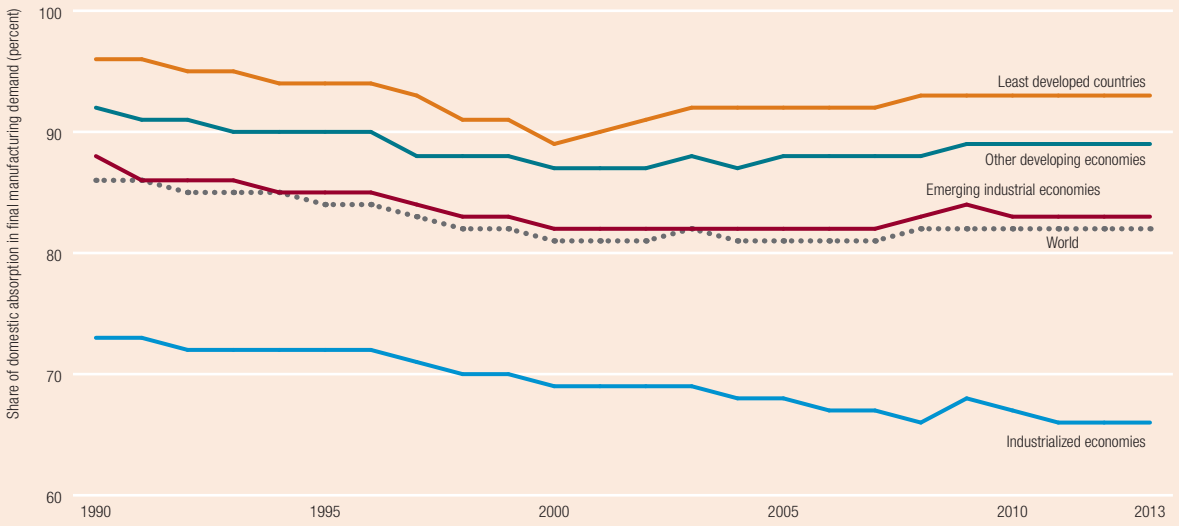
Globalization has made foreign demand increasingly important for all country groups. This trend was most evident in 1990–2000 (since 2000 the relative size of domestic absorption in developing and emerging industrial economies has been growing again, thanks largely to rebalancing, notably in China, partially reversing the trend of the previous decade).

The importance of domestic demand as a source of income has increased across all country groups in recent years

An analytical approach based on international input-output tables captures the mechanisms linking domestic and foreign demand to income creation. The approach shifts the focus from the value added generated in the manufacturing sector to the income (or value added) created by the consumption of final manufactured goods—regardless of the sector in which income is generated.

> **Whether trade-driven industrialization has a beneficial effect depends crucially on how countries adjust their terms of trade**

Figure 8
Changing trends in the relative importance of domestic demand for final manufactures



Note: Domestic absorption comprises private household consumption, gross capital formation, and final consumption by governments and non-profit institutions. Each line shows the unweighted average of the indicator for the world and country groups. Industrialization level classification is based on Annex C1, Table C1.2.
Source: de Macedo and Lavopa (2017) based on the Eora Multi-Region Input-Output database (Lenzen et al. 2012; Lenzen et al. 2013).

The analysis shows that domestic demand is the main contributor to the creation of domestic value added in developing and emerging industrial economies. In contrast, foreign demand is more important in industrialized economies (Figure 3.7). The findings also reveal a generalized movement in recent years towards greater reliance on domestic demand, particularly in developing regions. Between 1990–2000 and 2000–2013, emerging industrial economies experienced a particularly rapid acceleration of income creation, as final demand for manufactures relied increasingly on domestic markets (Figure 3.8).

Some country groups rely more on domestic demand than others

Overall trends mask variations across regions. In developing and emerging industrial economies in Africa and especially Asia and the Pacific, reliance on domestic demand grew between 1990–2000 and 2000–2013. Developing countries in Latin America experienced slightly declining growth rates, accompanied by a marked increase in the importance of domestic markets. Only in Europe did the importance of domestic demand decline between the two periods (Figure 3.9).

Foreign demand

The income created from foreign demand depends on how countries adjust their terms of trade

The relationship between foreign demand for domestically produced goods and income creation is not unidirectional. Whether trade-driven industrialization has a beneficial effect depends crucially on how countries adjust their terms of trade. If countries consistently fail to upgrade their manufacturing export portfolios, for instance, they run the risk of seeing their terms of trade deteriorate, as commodification processes push industrial production in these countries towards inferior goods. Increasing the technological content of exports and upgrading quality can offset persistent declines in terms of trade. Innovation and technical change are therefore key for improving export prices and the terms of trade, which are crucial for long-run economic growth.

Whether and to what extent a country gains from its interactions with the global economy along the virtuous circle depends largely on the relationship between the value of its manufacturing exports and the price of

“The manufacturing income terms of trade reflects the ‘purchasing power’ of manufacturing exports

its imports. A measure that captures this relationship is the manufacturing income terms of trade (MITT). The MITT reflects the “purchasing power” of manufacturing exports—how much a country can import using the income generated by the exports of its manufacturing sector. As one would expect, there is a close positive correlation between income levels and MITT: Richer countries not only export more, they also export goods with higher technological content (Figure 4.3).

Greater purchasing power of manufacturing exports is associated with higher per capita income growth

A strong positive correlation also exists between the changes in the purchasing power of manufacturing exports and growth of per capita income: Country groups that improved their MITT most rapidly between 2003 and 2015 also grew faster (Figure 9).

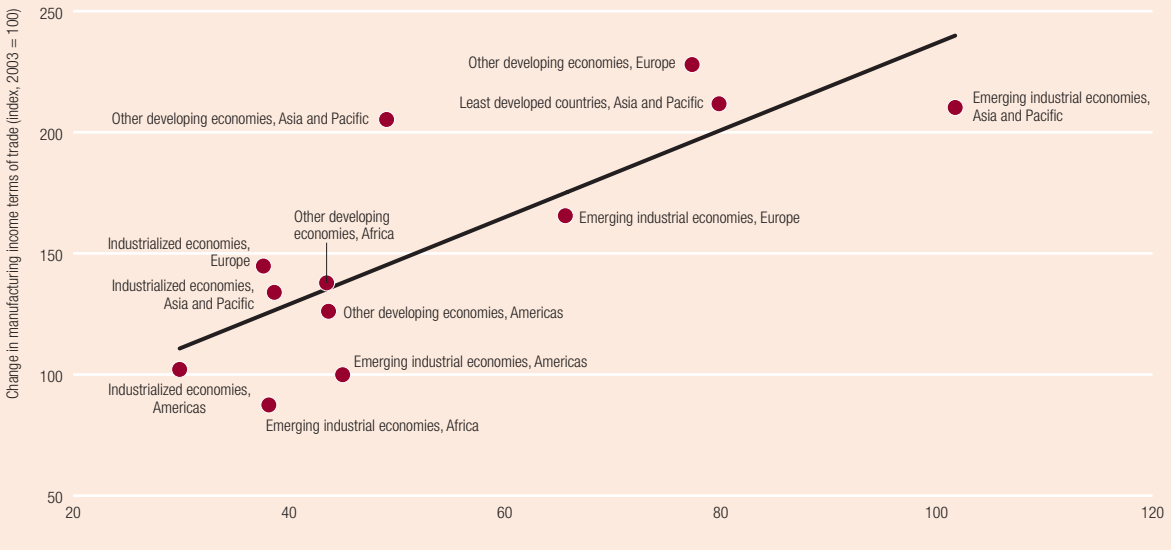
In some cases, a higher volume of exports at declining prices increases the purchasing power of manufacturing exports

Price or volume effects can drive improvements in the MITT. The rapid increase in the purchasing power of manufacturing exports in the emerging industrial economies in the Asia-Pacific region in 2003–2014, for instance, reflects increases in export volumes, which outweighed the moderate decrease in the manufacturing barter terms of trade (the ratio between the price of a country’s manufactured exports and imports). Emerging industrial economies in the Asia and Pacific region seem to have increased their export volumes by lowering prices (Figure 4.6).

In other cases, diversification and quality upgrading increase the purchasing power of manufacturing exports

Other country groups display different dynamics and the increase in the purchasing power of manufacturing exports is driven by improvements in export prices. This seems to be the case, for example, in the other developing economies in Africa, where the increase in the MITT is mostly explained by an increase in the manufacturing barter terms of trade. Countries can increase export prices by diversifying the composition of their export baskets and upgrading the technological content of their exports’ active

Figure 9
Increasing the purchasing power of exports is associated with higher growth rates in per capita GDP



Note: All values for the period 2003–2014 are in constant 2003 PPP$ (PPP is purchasing power parity). GDP is gross domestic product. Outliers with changes of over 500 percent relative to the base year have been omitted. Regional and industrialization level classifications are based on, respectively, Annex C1, Table C1.1 and C1.2.
Source: UNIDO elaboration based on BACI International Trade Database (Gaulier and Zignago 2010).

> **“ Wages are not just a production cost—they are also a fundamental driver of aggregate demand**

product lines. Between 2003 and 2014 increases in the average product complexity of exports correlate positively with changes in the manufacturing barter terms of trade. The same observation applies to technological upgrading in active product lines (Figure 4.8). This evidence supports the view that technological upgrading is a crucial means of avoiding persistent declines in a country's terms of trade.

Rising unit values for manufactures are associated with long-run growth in GDP per capita

The need for technological upgrading for domestic income generation becomes even more apparent when one looks directly at the relationship between manufacturing export prices and economic growth. The long-run impact of increases in a country's manufacturing export unit values, which are typically used as proxy for export prices, on domestic income generation appears to be broadly positive, across all country groups and regions (Figure 4.13). Given the strong association between technological content and unit values, there seems to be strong evidence in favour of upgrading the technological content of exports to capture incomes from the global demand of manufactures.

Keeping the virtuous circle turning

A critical mass of income must be generated within the economy—and it should be well distributed

High inequality within countries can hamper the diffusion and massification of goods

An income distribution that is highly skewed towards the rich is likely to dampen the consumption of domestically produced manufactures, because the wealthiest households have different consumption patterns from the rest and their preferences are more easily met by imports. Countries with household ownership rates of common consumer durables (such as washing machines and vacuum cleaners) that are lower than expected for their income level tend also to have below-average income equality. A country with high income inequality may have too few consumers to sustain domestic manufacturing production (Figure 2.17).

An expanding middle class increases opportunities to generate income from domestic demand

Improvements in the distribution of income and, in particular, the size of the middle class are key factors fuelling domestic demand for manufactures and driving income creation along the circle. This report shows a clear positive correlation between the growth rate of value added induced by domestic manufacturing demand and the expansion in the share of people in the middle-income segment between 2001 and 2011 (Figure 3.11).

Increasing real wages foster domestic demand and drive income generation

Wages are not just a production cost that needs to be reduced to achieve greater competitiveness. They are also a fundamental driver of aggregate demand—and are more likely than other sources of income to be spent on consumption items. The average annual growth rate of domestic value added generated by domestic absorption of final manufactured goods in 2001–2011 is positively correlated with the growth rate of real wages (Figure 3.10).

Diversification of consumption baskets fuels income creation

The creation of incomes from domestic demand is also positively correlated with the diversification of domestic private household consumption of manufactures.[3] Countries that diversified their consumption baskets the most between 2005 and 2011 tended to have the highest annual growth rates in income generated by domestic absorption of manufactures (Figure 3.12).

3. The diversification of domestic consumption was estimated using data from the World Bank's International Comparison Program database. These data were used to estimate proxies for the degree of diversity in manufacturing consumption baskets at the country level in 2005 and 2011. Diversification was defined as the change in this index between the two years.

> **Industrial capabilities must be in place for domestic producers to serve growing demand**

Measuring the industrial capabilities needed

Benefiting from these factors requires industrial capabilities

These three factors—expansion of the middle class, real wage growth and diversification of domestic consumption—are critical to industrial development and the functioning of the virtuous circle. Not all countries may be able to exploit them to the same degree. Industrial capabilities must be in place for domestic producers to serve growing demand.

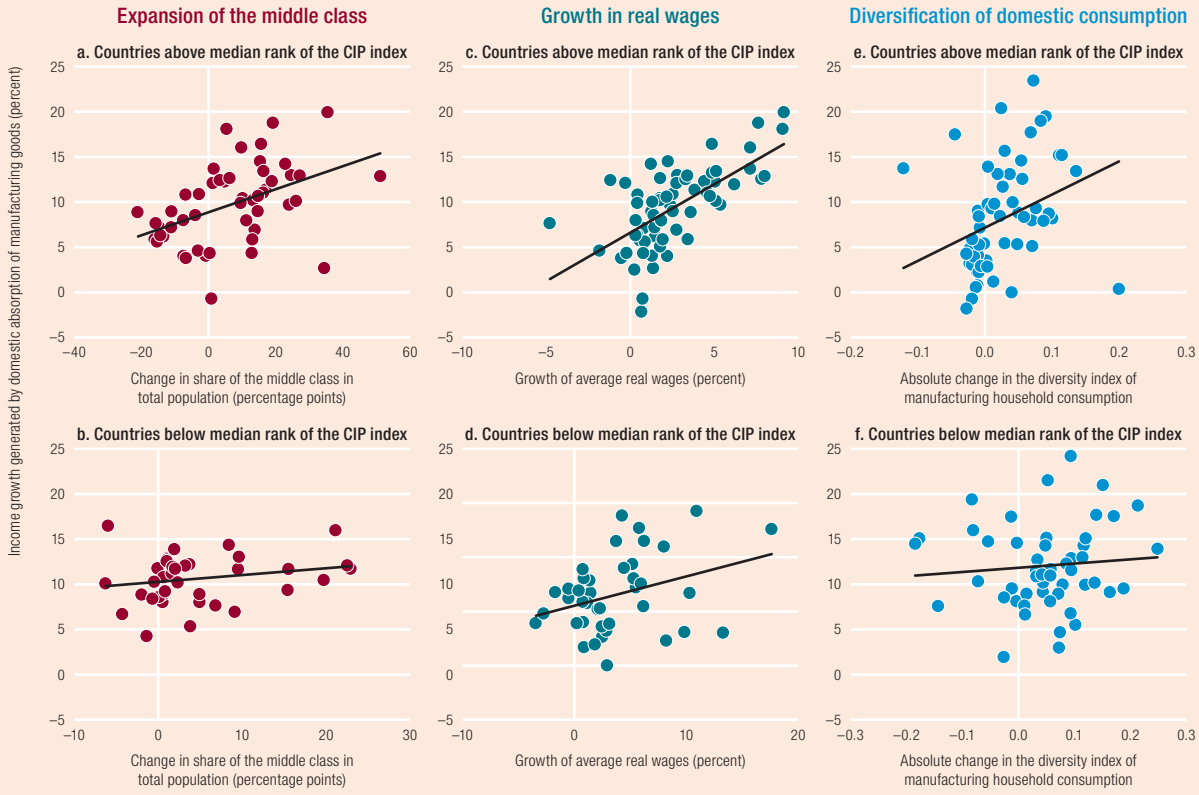
UNIDO's Competitive Industrial Performance (CIP) index provides a way to assess countries' industrial capabilities. It captures in a single measure the ability of countries to produce and export manufactured goods competitively and achieve structural transformation. Countries that in the early 2000s ranked higher on the CIP index were more successful in capturing incomes from the three factors between 2001 and 2011. The positive relationships appear stronger for countries with higher CIP rankings, particularly for real wage growth and diversification of domestic demand (Figure 10).

Balance-of-payments tensions must be avoided

As income grows and demand diversifies, leakages to imported goods increase

Domestic constraints to market size can imperil the virtuous circle. International conditions can, too.

Figure 10
Higher industrial capabilities are needed to benefit from middle class expansion, real wages gains and diversification of domestic consumption



Note: All values are for the period 2001–2011 in panels a, b, c and d, and for the period 2005–2011 in panels e and f. Income is in current $ and wages are in constant 2011 PPP$ (PPP is purchasing power parity). Income growth induced by domestic demand is estimated following the approach proposed in de Macedo and Lavopa (2017). See Chapter 8 for details regarding the calculation and analysis of UNIDO's Competitive Industrial Performance (CIP) index. In the case of consumption diversification, because the measure used refers to 2005–2011, countries are split according to the CIP ranking in 2005. In all other cases, countries are split according to the CIP ranking in 2001.
Source: UNIDO elaboration based on the Eora Multi-Region Input-Output database (Lenzen et al. 2012; Lenzen et al. 2013), the 2005 and 2011 International Comparison Program dataset (World Bank 2008 and 2015), Penn World Table 9.0 (Feenstra et al. 2016) and Kochhar (2015).

> **"Countries must lift the purchasing power of their manufactured exports to avoid excessive pressures on their external accounts**

In open economies where domestic demand leaks towards the consumption of imports, market-size gains from economies of scale and productivity often benefit foreign producers instead of domestic ones.[4] This appears particularly relevant against the current backdrop of increasing cross-border fragmentation of production, or "globalization," which is reflected in growing import shares in final domestic absorption of manufactures and increasing foreign content in domestically produced goods.

Countries need to generate foreign exchange to fund increasing imports

As countries get richer consumer preferences diversify from less sophisticated domestically sourced goods to imported ones, and goods produced domestically tend to draw increasingly on inputs and components sourced abroad. For this reason, foreign exchange requirements generally increase and countries must take steps to lift the purchasing power of their manufactured exports, in order to avoid excessive pressure on their external accounts.

If growing domestic consumption is satisfied through imports without an equivalent expansion in exports, economic growth is likely to hit balance-of-payments problems. The need to strengthen export capabilities, especially in emerging industrial economies rebalancing their economies, is critical.

Globally declining prices could lead some countries into commodity traps

Not all export strategies are sustainable over time. Global declines in the prices of certain categories of goods can push countries into "commodity traps," where their gains from exports will deteriorate over time. This, in turn, crimps their potential to raise income and generate foreign exchange, particularly when they export labour-intensive manufactured goods that are easy to imitate. The resulting competition exerts downward pressure on prices. In these conditions an export-oriented strategy to diversify from primary into manufactured goods will struggle, unless policy-makers pursue export diversification and upgrading.

The price channel must be kept working, and consumers given information on goods

Productivity increases in manufacturing are passed on to consumers if relative prices decline

As manufacturing productivity increases, output prices decline, because unit costs fall—a crucial underpinning of the virtuous circle. This price channel needs competition in product markets to ensure that productivity increases are passed on, in whole or in part, to consumers as lower prices.

Barriers to competition may arise within value chains. Consumer welfare is hurt when firms enjoy rents from their dominant position in a sector or chain. For the circle to be sustained, the relative prices of manufactured products should be allowed to decline to reflect productivity growth, and barriers to competition should be reduced.

Lack of information on quality and safety of consumer goods can harm the circle's welfare gains

The supply of environmentally unsustainable or substandard products (such as counterfeit drugs) diminishes consumer welfare. Lack of information on the quality and safety of consumer goods may greatly reduce the welfare gains from the virtuous circle. The introduction of stringent quality and safety standards is therefore important for the circle to stay virtuous.

Quality and safety standards also lead to increased market access

In a trade environment that is increasingly driven by technical regulations and quality standards, compliance with standards ensures that firms in developing

4. This negative effect can be counterbalanced by other benefits that imports bring to the domestic economy. Imports of capital and intermediate goods that are of higher quality than those available domestically can increase the productivity of importing firms. And if domestic firms are capable of absorbing the foreign technology embodied in imported goods, imports may result in knowledge spillovers and productivity gains.

> **“Access to good labour conditions is a key constituent of an industrialization agenda with social inclusiveness at its core**

and emerging industrial economies continue to enjoy market access—and even increase their export shares in industrialized economies. Upgrading the quality of goods for export is therefore essential to remain competitive.

Challenges to social inclusiveness and environmental sustainability

Social inclusiveness and income inequality

Incomes created along the circle may not flow to the poorest people in society

The virtuous circle does not itself guarantee socially inclusive or environmentally sustainable outcomes. Social inclusiveness requires that at least two conditions are in place. First, part of the income generated by the circle should flow to the poorest people in society, increasing welfare at the bottom of the pyramid. Second, traditionally marginalized groups should be able to participate fully in the market.

Several global trends hinder these aspirations. When the largest share of income goes to highly skilled workers, the inclusiveness of the circle is weakened. The trend towards greater automation of production skews the distribution of profits towards factory owners and managing directors, to the detriment of workers. Excessive concentration of income at the top of the distribution also has detrimental effects on the circle's functioning, as a critical mass of income is needed to launch the process.

Price declines may be abetted by falling labour standards

Without regulation, national or international, competitive pressures in global markets can undermine social inclusiveness. Many global value chains are highly cost-effective, but few provide much social protection, particularly for the low-skill and low-tech links (where competitive pressures are stronger). In these conditions the virtuous circle may not be so virtuous, instead benefiting groups of consumers in industrialized economies at the expense of workers.

Other potentially negative societal impacts

Industrial jobs can be hazardous, even deadly, particularly in lower income countries with labour-intensive plants and weak employment and environmental standards. The health and well-being of the wider community may also suffer from unchecked pollution. Access to good labour conditions and a healthy environment is a key constituent of an industrialization agenda with social inclusiveness at its core.

Concentration of production in a few industrial hubs

More broadly, how inclusive the circle is at the global level depends on the extent to which countries benefit from its income-generation mechanisms, as well as the modality in which they participate. When countries remain caught in the lower segments of global production—or are left out altogether—the circle cannot be regarded as globally inclusive.

Gains from the circle are becoming geographically concentrated

In 1990 about half of manufacturing production in developing and emerging industrial economies came from the five largest economies in the group (Brazil, China, India, Indonesia and Mexico). In 2016 these five countries accounted for roughly three-quarters of the group's total, with China alone shooting up to 55 percent of that total, from 15 percent. This trend raises concern about the circle's potential to drive social inclusiveness worldwide (Figure 7.4).

Technology has the potential to change the geography of production

ICT can help producers—including producers in countries that are currently marginalized in international production networks—tap hitherto inaccessible markets. When combined with emerging technologies that enable new forms of manufacturing—such as additive manufacturing or 3D printing—it can help entrepreneurs access world markets for mass customized articles. Innovations in manufacturing can lead towards a more even distribution of production activities across borders.

> **Since the early 1970s, the world has been consuming natural resources faster than the earth has been producing them**

Environmental sustainability—or lack of it

Mass consumption puts pressures on the environment

The growing mass consumption of manufactured products is likely to increase demand for non-renewable natural resources, such as fossil fuel energy and materials, putting severe pressure on the environment. Manufacturing also generates huge amounts of waste, putting current disposal systems under mounting pressure. The virtuous circle is thus characterized by binding environmental constraints.

Current consumption patterns may be unsustainable

Since the early 1970s, the world has been consuming natural resources faster than the earth has been producing them (Figure 11). There is no guarantee that natural resource–based economic activities will continue once the stock is depleted. The current path of production and consumption may be unsustainable.

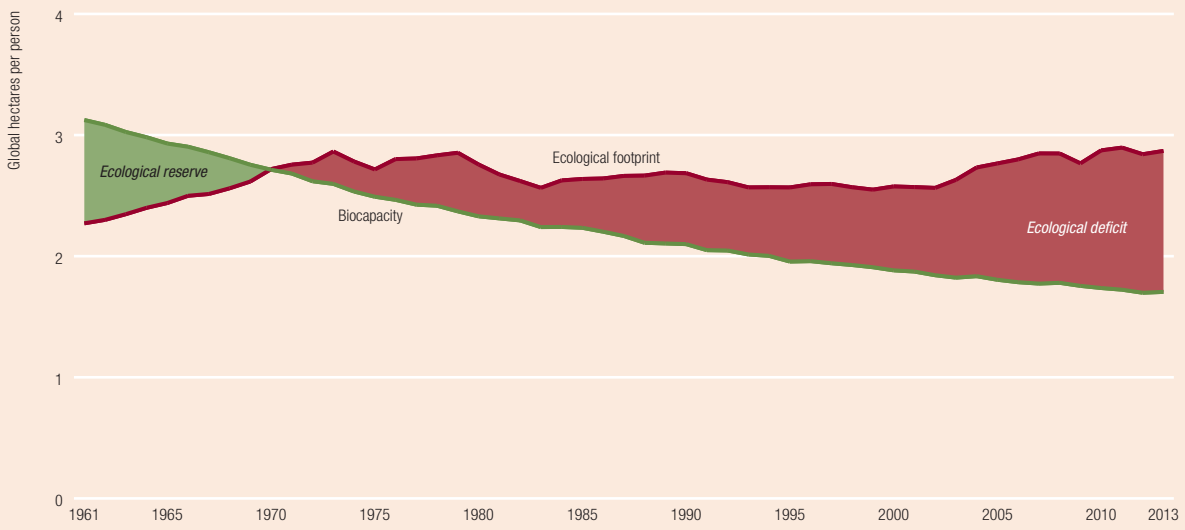
Climate change is a heavy source of long-term pressure on the environment, especially in poorer countries. Between 2020 and 2100, annual growth of GDP per capita could fall from 3.2 percent to 2.6 percent as a result of climate change–related impacts on capital accumulation and total factor productivity (Moore and Diaz 2015).

Waste is also a growing problem. Increased income generates more packaging, imports, electronic waste and appliances. Although waste is projected to peak by 2050 in the countries comprising the Organisation for Economic Co-operation and Development (OECD) and by 2075 in Asia and Pacific, it will continue to rise in the fast-growing cities of Sub-Saharan Africa (Hoornweg et al. 2013).

Environmental pressures from increasing living standards are still too strong…

Carbon dioxide emissions (Figure 5.6) and the use of materials (Figure 5.7) increased in manufacturing between 1995 and 2014. The trend of emissions and materials consumption in manufacturing can be

Figure 11
Global biocapacity went into the red nearly half a century ago



Note: Global Footprint Network refers to global biocapacity as "the ecosystems' capacity to produce biological materials used by people and to absorb waste material generated by humans, under current management schemes and extraction technologies." The ecological footprint is defined as the amount of biologically productive land and water needed by an entity—individual, population or activity—to facilitate the production of all consumed resources and to absorb the waste generated in this process. An entity's footprint is measured in global hectares and given the global nature of trade, the footprint takes into account land and sea from all over the world. Read more definitions related to the National Footprint Accounts at: http://data.footprintnetwork.org.
Source: Global Footprint Network National Footprint Accounts, 2017 Edition (Global Footprint Network 2017a).

> **Expanding markets for 'environmental goods' would contribute to a sustainable virtuous circle of manufacturing consumption**

understood by using a decomposition approach that investigates the impact of three main components: the scale effect (the increase in environmental pressure from higher living standards and consumption), the intensity effect (the decrease in environmental pressure per unit of value added or consumption as a result of technological change) and the composition effect (changes in environmental pressure from variations in the sectoral composition of consumption and production patterns). The scale effect is preponderant in explaining the increase of emissions and use of materials, especially in emerging economies (Figure 5.8).

Reconciling industrialization with environmental protection

Expanding markets for "environmental goods" would contribute to a *sustainable* virtuous circle of manufacturing consumption (Figure 12).[5] With such markets, industrial firms would be able to replace fossil fuel inputs with renewable energy sources. Business models that help firms increase their resource efficiency would also promote sustainability. By adopting circular economy models, for instance, countries could radically transform the management of waste by enabling a "closed loop" of material use between production and consumption. All these developments would help mitigate environmental impacts, allowing the production of larger volumes of output with fewer inputs (Bourguignon 2016).

Fostering the circular economy

The full operationalization of the sustainable virtuous circle of consumption is consistent with the realization of a circular economy. According to UNIDO (2017a), in a circular economy "products are designed for durability, reuse and recyclability, and materials for new products come from old products. As much as possible, everything is reused, remanufactured, recycled back into a raw material, used as a source of energy, or as a last resort, disposed of."

What prevents a rapid transition towards the full massification of environmental goods?

Environmental goods have not completed their transition towards massification: Over the period 1988–2014 environmental goods, as classified by the OECD list,[6] despite a growing trend accounted for less than 8 percent of world exports (Figure 5.11; Cantore and Cheng 2017). A variety of obstacles impedes consumers from moving towards goods characterized by a lower environmental impact.

High production costs and consumer prices

The production of environmental goods requires higher-cost materials and production techniques. When the consumption of a good is price elastic, consumers tend to prefer more affordable goods and are generally unwilling to pay a premium for environmental goods.

Fortunately, the prices of many environmental goods are dropping radically, because of learning effects and technological change. Light-emitting diode (LED) lamps, for instance, could soon complete their massification process and fully replace less energy-efficient lamps.

Other factors affecting the consumption of environmental goods

The medium- and long-term savings associated with the consumption of more energy-efficient products influence consumers. But consumers do not always shift their preferences to goods with a lower environmental footprint rapidly enough to decouple economic growth and environmental degradation.

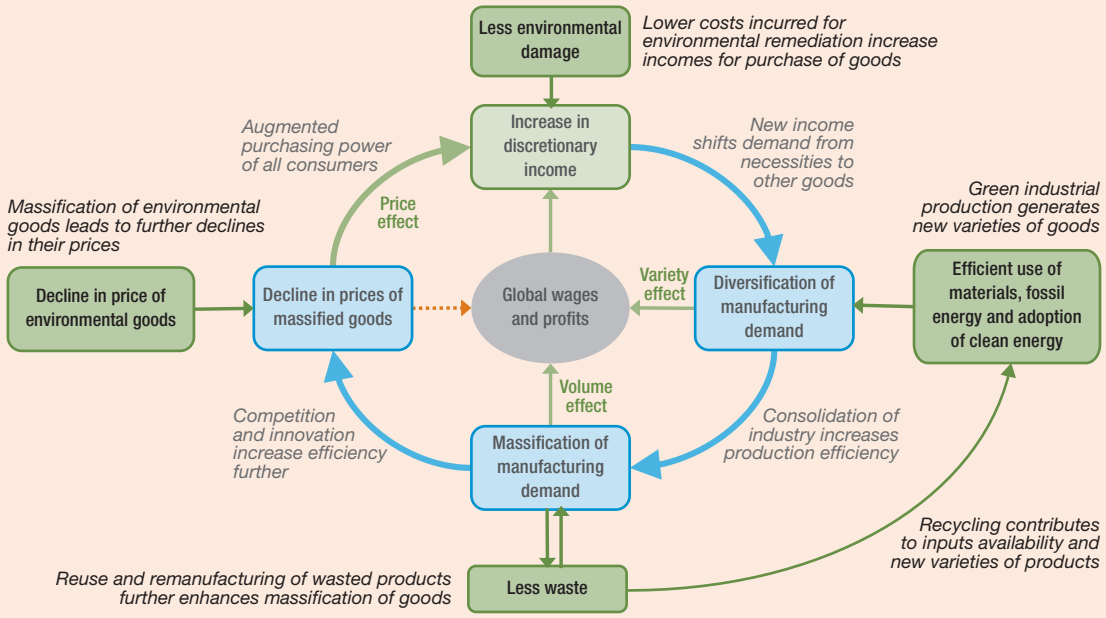
The purchase of an environmental good is based on three crucial stages. First, consumers become

5. *Industrial Development Report 2018* defines environmental goods as those that respond to basic needs and bring a better quality of life while minimizing the use of natural resources and toxic materials as well as the emission of waste and pollutants over the life cycle of the service or product so as not to jeopardize the needs of further generations. This definition is inspired by the Oslo Symposium of 1994 (Norwegian Ministry of Environment 1994).

6. This list is presented and discussed in Steenblick (2005). As the author emphasizes, however, the OECD list of environmental goods is far from exhaustive and does not cover all environmental goods.

> **Policy-makers should strike a balance between policies that target supply and demand**

Figure 12
A sustainable virtuous circle of manufacturing goods



Source: UNIDO elaboration.

aware of the environmental threat and keen to help mitigate it through consumption. Second, they acquire the necessary information about the impact of environmental goods on the environment. Third, they buy the environmental good, on the basis of their pro-environment attitude and their trust that the good delivers the expected environmental impact. At all three stages, biases may affect consumer behaviour:

- Too little public awareness about the seriousness of the impending environmental threat is a barrier. In one survey almost half the respondents in some industrialized economies believed the environmental impacts to be overstated (OECD 2014).
- Lack of information on products, costs and, in some instances, potential savings also hinders consumption of environmental goods. Labelling and certification can help highlight the environment-friendly attributes of products, as well as the monetary benefits, steering consumers towards buying them. Labelling and marketing campaigns for environmental goods can also generate profits for firms (Figure 5.20).
- Perceptions that companies may make exaggerated claims or even lie about their products' environmental attributes prevent wider diffusion of sustainable and energy-efficient products.

Managing demand for manufactured goods

Moving from findings to action

The virtuous circle involves a recursive process of income generation, product diversification, quality upgrading, mass consumption and changes in volumes and relative prices of manufactured products. It draws links to innovation, production efficiency and productivity gains. Various conditions set the circle in motion. How can policy-makers in developing countries turn these findings into areas for intervention?

“Governments may directly intervene in the economic system, foster partnerships or underpin the private sector’s role as the driver of industrialization

Economic goals remain top priorities in industrial policy debates

Because countries differ significantly in their productive and technological capabilities, as well as policy-making abilities, industrial policy remains open to learning and experimentation in search of practical ways to conciliate distinct, and often conflicting, approaches to industrialization. Policy-makers should strike a balance between policies that target supply, demand, or both, considering the risks of government intervention and the changing environment for industrial policy.

A demand perspective to industrial policy

The contribution of demand for manufactured goods and related services to structural change should not be underestimated. Changes in demand can either constrain or enhance opportunities for industrialization. The extent to which demand drives industrialization depends on factors such as the size of the economy and the domestic market, the strength of domestic technological and manufacturing capabilities, the natural resources endowment, the extent of international collaboration and insertion into global value chains and the relative weight granted to domestic or external markets for domestic manufactured products.

A continuum: From framework conditions to actionable variables

Demand for manufactured goods can be interpreted as a variable along a continuum. At one end, demand can be a framework condition, partially or completely outside the control of policy-makers. In this case, government can work as (a mix of) facilitator, technological capability-building partner or market antenna. At the other end, demand can be an actionable variable in industrial policy intervention. In this case, government can work as (a combination of) information provider/awareness raiser, regulator, enabler/co-generator of innovation or consumer (through public procurement). The two cases lead governments to assume distinct roles and implement different combinations of supply- and demand-oriented interventions. Governments may directly intervene in the economic system, foster partnerships or underpin the private sector’s role as the driver of industrialization.

Framework conditions

Framework conditions can either constrain or open windows of opportunity for industrialization. When demand is perceived as a framework condition, responses are generally supply driven (including trade- or exchange rate-related regimes, fiscal incentives, competition and labour policy reforms, incentives for diversification and technological upgrading), connected to at least one of three possible government roles:

- Facilitating the removal of market failures, so that domestic firms can build on current comparative advantages.
- Promoting domestic technological and productive capabilities, to favour entry into sectors otherwise impossible to develop given the country’s traditional comparative advantages.
- Supporting development of capacities to help domestic firms identify or anticipate demand changes (such as through technological foresight or related practices).

Actionable variables: Four government roles

With actionable variables, government can play four major roles to steer demand towards inclusive and sustainable industrialization goals, alone or in combination: regulation (their traditional role), knowledge brokerage (to signal market opportunities or desired directions for industrialization and related consumer behaviour), active promotion of industrial innovation and public procurement of manufactured goods. Table 1 presents a schematic of various government roles in relation to demand.

Examples of demand-driven industrial policies

Developing and emerging industrial economies in Africa, Asia and Latin America exemplify how demand-driven policies have been deployed in pursuit of economic, social inclusiveness and environmental

"Government can steer demand towards inclusive and sustainable industrialization through regulation, knowledge brokerage, innovation promotion and public procurement

Table 1
Government roles and industrial policy interventions for demand as a framework condition or an actionable variable

Nature of demand/ role of government	Description of intervention	Examples of interventions
Framework condition		
Facilitator of industrialization and upgrading	Remove market failures so that firms can build on comparative advantages to take advantage of external demand conditions or opportunities for industrialization.	• Fiscal, monetary, exchange rate and employment policies • Provision of credits or loan guarantees • Incentives for foreign direct investment (FDI) • Export promotion and competition policies
Technological capability-building partner	Promote adoption, use and (eventually) development of technologies that enhance knowledge bases and presence in domestic and international markets.	• Selective industry protection • Creation of public research centres • Promotion of corporate research and development (R&D) • Technology transfer mechanisms and joint venture agreements • Export promotion • Import substitution • Selective FDI • Skills training
Market antenna	Help domestic agents identify or anticipate changes in technologies with implications for the dynamics of manufacturing.	• Foresight services and market intelligence
Actionable variable		
Information provider and/or awareness raiser	Influence consumer knowledge, awareness, readiness and capabilities to consume certain manufacturing products.	• Communication, education and awareness-raising campaigns • National brands • Voluntary labelling
Regulator	Stimulate and regulate consumption of manufacturing products or influence consumer behaviour through changes in relative prices.	• Fiscal (taxes, tariffs, quotas, subsidies, tax credits or exemptions); monetary; and exchange rate policies
	Influence consumption of manufacturing products or guide consumer behaviour through laws, directives and regulations.	• Mandatory standards and labels
Enabler/co-generator of innovation	Promote, enhance or create demand for innovative products by targeting final users.	• Grants and subsidies for consumption of innovation
Consumer	Promote consumption of manufacturing products, guide strategic investments in innovation, address societal needs through provision of manufactured goods and ensure a market for strategic industries or economic activities.	• Public procurement

Source: UNIDO elaboration based on Santiago Rodríguez and Weiss (2017), Santiago Rodríguez et al. (2017) and Lin and Chang (2009).

sustainability goals, often simultaneously. Time is frequently of the essence, despite the policies' heterogeneity.

Economic goals

Policy-makers have adopted instruments to create demand for strategic sectors or firms, dismantling barriers to participating in international trade, informing consumers about the quality and safety of consumer goods and so on. Examples include strategic public procurement (such as local content requirements in South Africa's railway or Sri Lanka's ICT sector); adoption of standards and certification (quality upgrading and export promotion in Rwanda's coffee sector); and knowledge and information to influence consumer awareness and choices to foster demand for domestic producers (national branding campaigns in Ecuador and Uganda). Public demand, in combination with regulation and fostering aggressive market orientations, can enable domestic firms to respond to

“Demand-driven policies can be tailored to suit different government roles and intended development outcomes

emerging demands in certain market segments with potential to sustain growth over the medium to long term (aircraft manufacturing in Brazil).

Social inclusiveness goals

Policy-makers can facilitate access to goods, reduce their price and enhance their quality. Examples include health reform in Mexico and regional efforts to reduce the cost of essential medicines in Latin America through pooled procurement.

Countries can also seek to ensure equal access by manufacturers from societal sectors that were deprived of or face unfavourable access to markets. Examples include quotas in strategic public procurement for women-led enterprises in the Dominican Republic and preferential access and capacity building for small and medium-size enterprises in Sri Lanka’s ICT sector.

Environmental sustainability goals

To render the virtuous circle environmentally sustainable, countries must remove barriers and stimulate drivers for massifying environmental goods. They can do so through market- or regulatory-based policies.

Direct incentives to consumers seek to reorient industrial activity towards cleaner processes or the adoption of more environmental-friendly products and services. Examples include subsidies for buying “new-energy vehicles” in China and the Republic of Korea. Governments can also enhance perceived benefits through consumer education and awareness raising or affect demand for environmental goods directly through public procurement.

International policy coordination can be invaluable, as domestic efforts seem insufficient to address global environmental challenges. One example of successful coordination is the Ecolabel, introduced in 1992 as a third-party certified standard to promote products and services with reduced environmental impacts in the European market. Another is the Montreal Protocol of 1987. Changes in the international regulation of production were key drivers to stimulate different, more sustainable consumption patterns. In its first 30 years the Montreal Protocol achieved the almost total phase-out of five groups of ozone-depleting substances and an almost 40 percent reduction in the consumption and production of hydrochlorofluorocarbons, with a view to phasing them out entirely by 2030.

International partnerships contribute to inclusive and sustainable industrialization

Governments can partner with international organizations to accelerate progress towards inclusive and sustainable industrialization. Leveraging complementary assets and international expertise within the framework of national industrial strategies has multiple benefits. International bodies help countries meet consumer demand in advanced economies by strengthening compliance with quality and safety standards.

Policies are heterogeneous

Demand-driven policies can be tailored to suit different government roles and intended development outcomes. Those policies are better understood within complex policy mixes, in interaction with supply-driven interventions. There is scope for synergies: Decisions made by a ministry of industry can affect areas such as health, and decisions made by ministries of health (or other social sectors) can signal gaps in the development of domestic manufacturing activities. Governments need to set clear priorities and goals and be aware of possible trade-offs between policy tools and intended targets. Enhanced monitoring and evaluation is needed to better codify experiences in the use of demand-driven policy instruments.

Finally

Governments should carefully consider the scope of demand-driven interventions to address social- and environment-related outcomes, helping better align the virtuous circle with the objectives of inclusive and sustainable industrial development.

Part A

Demand for manufacturing: Driving inclusive and sustainable industrial development

Chapter 1

Bringing "affordable variety" to all

A new perspective: Demand

The consumption of manufactured goods is both one of the prime forces driving economic development and one of its most visible results. As income rises, households tend to diversify their consumption patterns away from basic needs (food and shelter) towards a more sophisticated variety of goods and services. New demands create new markets, which in turn give rise to the emergence of new industries. These industries expand, achieve optimal scale of operations and, through a process of continuous technological innovation and competition, bring down prices for the new goods, making them affordable for an ever-larger number of people. Along this process, new incomes are generated, both directly (through higher wages and profits in the new or expanding industries) and indirectly (through the real income effect). Income gains push demand towards larger volumes and further diversification, create new market opportunities and lead to the creation of new goods and services and the emergence of new industries or the sophistication of existing ones, restarting the circle in a self-reinforcing fashion.

This report examines the core mechanisms behind this process and identifies the main challenges and opportunities that arise from them. The starting point is a reassessment of the importance of manufacturing from a demand perspective (Box 1.1). Historically, discussions on industrialization have focused on supply-side perspectives—at the expense, in part, of demand variables and their interaction with supply.

A renewed focus on demand means that several variables acquire analytical significance. From a supply-side perspective, one would need to consider the interplay and trade-offs between sales, profits, wages and job creation. From a demand perspective, the consumer's perspective becomes central, making it necessary to consider variables such as product quality, variety and price. The quality and variety of products on the market at any point in time play a fundamental role in determining consumer welfare. Moreover, the price of any good on the market will determine whether—and to what extent—existing demand is satisfied.

A renewed focus on demand also entails a re-assessment of the importance of the manufacturing sector. In terms of the creation of goods—regardless of their value or the number of jobs created—the importance of manufacturing at the global level has increased in the past few decades, not declined. The main reason behind the decline of manufacturing's relative size in terms of value and jobs created as countries get richer is one of the main attributes of industrial development—bringing less expensive and higher-quality goods to everyone.

A demand perspective towards industrial development also entails an analysis of the positive effects on living standards and consumer welfare of new varieties and qualities of goods affordable for all. Introducing new goods or upgrading the quality of existing goods improves the welfare of consumers by making certain wants easier to satisfy. The reduction in prices also has a real income effect, allowing consumers to purchase more (and different) goods with the same monetary income.

Shifting the focus towards demand also stresses the important contributions of industrial development towards achieving the Sustainable Development Goals (SDGs), as defined in the United Nations (UN) 2030 Agenda for Sustainable Development. A demand perspective reveals that it is the diversification of consumer preferences that spurs industrial development. When preferences steer away from the consumption of goods that are damaging to the environment or society, industrialization leads to greater inclusivity and sustainability, thus achieving SDG 9 ("Industry, innovation and infrastructure").

Examples beyond SDG 9 include poverty alleviation, through the provision of more affordable goods for the "bottom of the pyramid"[1] (SDG 1); increases in food security and health, through the provision of

"A demand perspective entails an analysis of the positive effects on living standards of new varieties and qualities of goods affordable for all

Box 1.1
What is demand?

"Demand" refers to the preference on the part of any economic agent (household, firm, government) to acquire a good or service at a given price. Individuals and households purchase a range of goods and services for consumption. Firms purchase new equipment and build plants to increase production. Governments procure goods and services that are put to use for the benefit of citizens. The process of satisfying each of these needs is a fundamental driver of economic activity. Demand for any good or service sets in motion a chain of activities that spurs additional demand, ranging from hiring labour to purchasing new machinery.

When goods are employed in the production of other goods, demand is defined as "intermediate." These goods include raw materials and other inputs. Intermediate goods are completely consumed (or transformed) in production and do not add to the stock of fixed capital assets. Because manufacturing requires larger amounts of inputs than other sectors, larger shares of intermediate consumption are associated with a higher level of industrialization. Moreover, as countries industrialize, the share of services in intermediate demand tends to increase, a reflection of the upgrading of manufacturing activities. Both the level and composition of intermediate consumption are therefore indicators of a country's industrialization.

"Final" demand is demand for goods that are not consumed during production. It consists of three main components: private consumption expenditure, public consumption expenditure and gross capital formation. Private consumption expenditure by households generally constitutes the largest share of a country's expenditure. It is determined by individuals' disposable income, as well as their accumulated wealth and savings. Demographic and cultural factors also affect private consumption patterns. Public consumption expenditure, which over the short run may follow a pro- or countercyclical pattern, has substantial influence on aggregate demand. It tends to increase with a country's income level. Gross capital formation consists of investments in fixed assets by producers residing in the country, as well as additions to the value of assets by producers.

In open economies intermediate and final demand can originate in the country where production takes place (domestic demand) or abroad (foreign demand). Final demand originating in the country is typically labelled "domestic absorption." It is not necessarily spent on domestically produced goods; it includes the purchase of both local and foreign goods. Purchases of foreign goods by domestic actors (demand "leakages") will not necessarily generate further incomes for domestic producers or have domestic multiplier effects. In contrast, exports of domestic goods abroad (demand "injections") will generate incomes and multiplier effects in the domestic economy.

Both domestic and foreign sources of demand are crucial for industrialization. They push firms to invest, increase their productivity and endeavour to meet new sources of demand.

good-quality food and medicines at affordable prices (SDG 2 and 3, respectively); improvements in gender equality, through the creation and diffusion of household consumer durables (SDG 5); and the cross-cutting theme of ensuring sustainable consumption and production patterns (SDG 12).

Has manufacturing become more important or less?

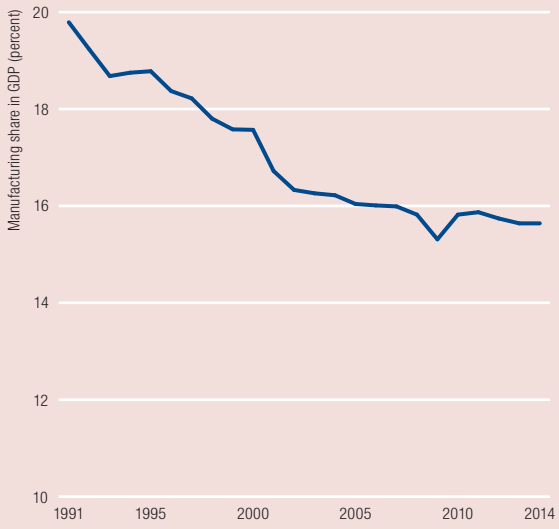
A common view holds that the importance of the manufacturing sector in the economy has been shrinking in the past few decades, as the "post-industrial" society has emerged. The empirical evidence to substantiate this claim is typically based on the nominal value added produced in the sector as a share of nominal gross domestic product (GDP). This metric shows that the global share of manufacturing in nominal GDP fell from almost 20 percent in 1991 to less than 16 percent in 2014 (Figure 1.1).[2]

Technological advances and the robotization of production processes have reduced the need for workers in manufacturing. Manufacturing's share of employment has trended downward, even with a short reversal from 2003 to 2007, falling from 14.5 percent in 1991 to 11.5 percent in 2014 (Figure 1.2).

Productivity differentials drive these trends. Real value added per manufacturing worker is higher than it is in the economy as a whole—and globally the difference has grown, not shrunk, since 1991 (Figure 1.3). Manufacturing has driven the increase in productivity

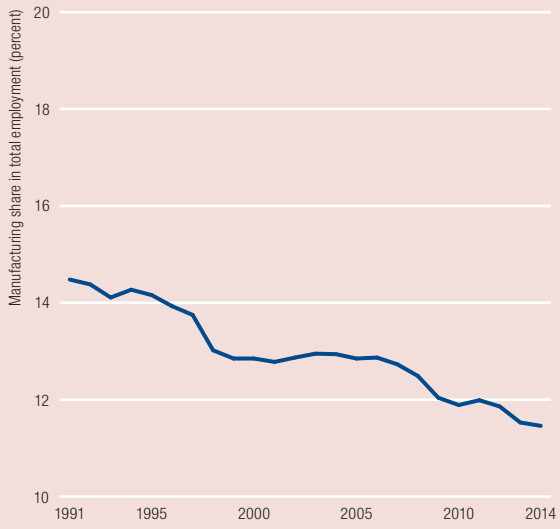
"The decline in the share of manufacturing in world GDP results from faster gains in productivity which are translated into declining relative prices

Figure 1.1
Declining trend in manufacturing's nominal share of world GDP



Note: All values are in current $. GDP is gross domestic product.
Source: UNIDO elaboration based on the Manufacturing Value Added database 2017 (UNIDO 2017f).

Figure 1.2
Falling share of manufacturing workers in world employment



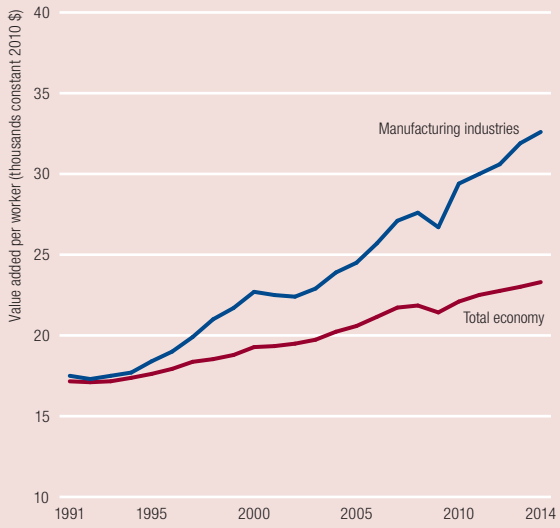
Source: UNIDO elaboration based on the databases Key Indicators of the Labour Market (2013 and 2015) and Trends Econometric Models (ILO 2016).

of industrialized and developing economies (see, for example, Szirmai et al. 2013 and UNIDO 2013 and 2015b). As a result of increases in productivity, the need for workers per unit of value added produced in manufacturing has declined, as has manufacturing's share of world employment.

More rapid gains in manufacturing productivity have also translated into lower relative prices when compared with the rest of the economy. Increases in manufacturing prices have been systematically lower than overall inflation in the global economy (see Figure 1.4, left axis). This difference is particularly clear after 2002, when the wedge between both series broadens significantly. The result of these trends is that the relative price of manufactured goods when compared with the overall economy has been falling systematically in the last 25 years. In 2014 the price of manufactured goods compared with the total economy was only 70 percent of what it was in 1991 (see Figure 1.4, right axis).

In view of these trends, the sharp decline in the nominal share of manufacturing in world GDP observed in Figure 1.1 is not surprising. The decline ultimately is the result of faster gains in productivity, which are translated into declining relative prices.

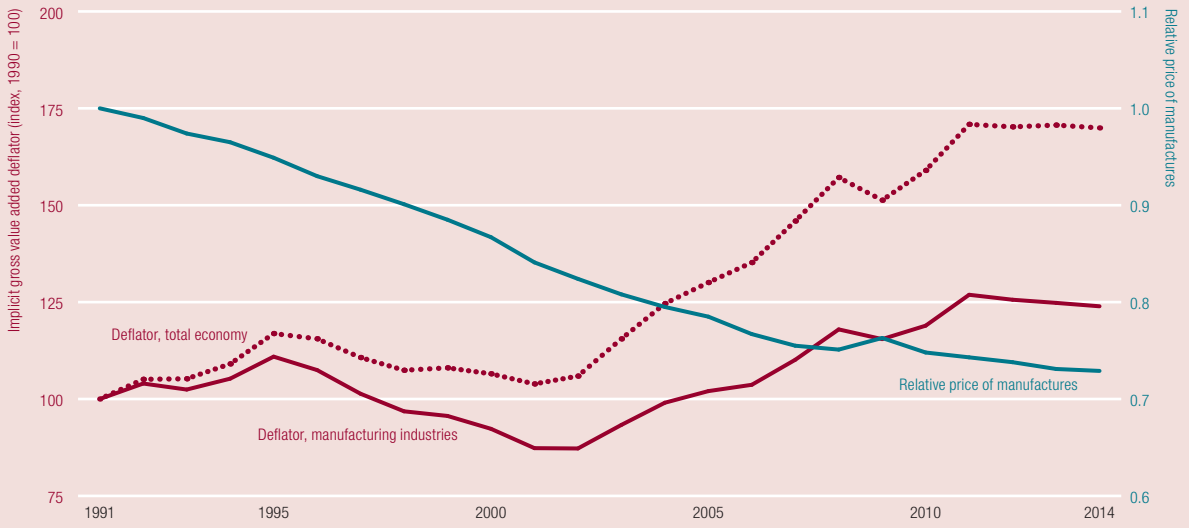
Figure 1.3
Increasing wedge between world real value added per worker in manufacturing and the total economy



Source: UNIDO elaboration based on the Manufacturing Value Added database 2017 (UNIDO 2017f) and the databases Key Indicators of the Labour Market (2013 and 2015) and Trends Econometric Models (ILO 2016).

> **"New manufactured goods tend to be introduced at relatively high prices and become less expensive and therefore affordable by more people over time**

Figure 1.4
Relative price of manufacturing in decline compared with the global economy



Note: Implicit gross value added deflator is calculated as the ratio between world value added at current prices and at constant prices of 2010. The relative price of manufactures is calculated as the relationship between the deflator of manufacturing industries and the total economy.
Source: UNIDO elaboration based on the Manufacturing Value Added database 2017 (UNIDO 2017f).

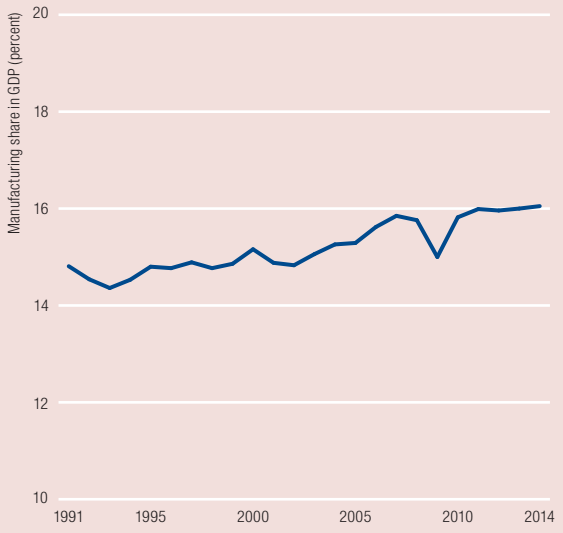
Examining the share of manufacturing using real values reveals a very different picture, in which there is no evidence of global deindustrialization. On the contrary, globally, the share of manufacturing in real GDP increased by more than 1 percentage point between 1991 and 2014 (Figure 1.5).

If we were to look at real values using 1991 as the base price year (instead of 2010, as in Figure 1.5), the share of manufacturing would be even larger—over 20 percent of the economy.[3] This is because most manufactured goods are much less expensive today than they were decades ago.

New manufactured goods tend to be introduced at relatively high prices and become less expensive and therefore affordable by more people over time. Globally, the quantity of manufactures increased faster than that of other goods and services, and prices of manufactures fell significantly more than prices of other goods and services.

These trends indicate that even though the share of manufacturing in nominal GDP has fallen, the importance of manufacturing in terms of the volume of goods produced and the number of consumers who can afford to buy them can be stable or even increase. This is in line with the findings of Rowthorn and Coutts (2004), who argue that the decline in the share

Figure 1.5
Increasing trend in the real share of manufacturing in world GDP



Note: All values are in constant 2010 $. GDP is gross domestic product.
Source: UNIDO elaboration based on the Manufacturing Value Added database 2017 (UNIDO 2017f).

"Manufacturing plays a much bigger role in consumption than in GDP or employment

of monetary income spent on manufactured goods in advanced economies has occurred not because the real quantity of manufactured goods consumed is stagnating but because the relative prices of manufactured goods have fallen. In their view, rising imports from low-wage countries alongside rising productivity at home make manufactured goods in advanced economies so inexpensive that consumers can buy much more with a smaller fraction of their income.

An exclusive focus on supply-side considerations in evaluating the evolving role of manufacturing may therefore be misleading. The importance of manufacturing cannot be confined to its share in GDP. It needs to reflect the fact that most of the items people consume daily are in one way or another produced by manufacturing industries.

Global statistics on consumption tend to be more restricted than statistics on employment and production. The prime sources are household expenditure surveys. Almost all countries conduct these surveys, but comparability across countries and over time is much lower than for production-side measures, making cross-country comparisons more difficult.

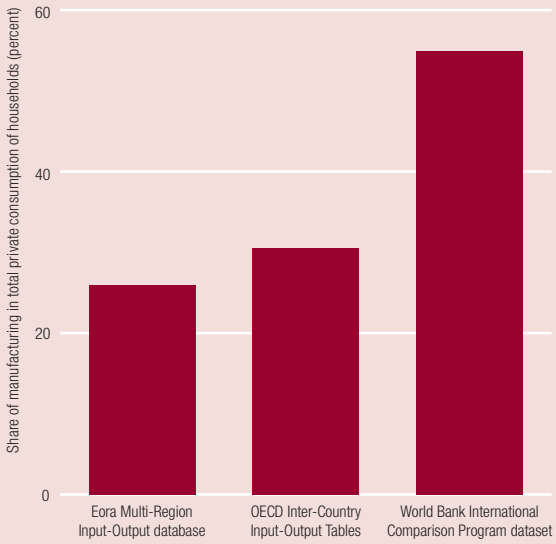
Two broad sets of internationally comparable data can be used. The first are international input-output tables produced by international initiatives.[4] They provide detailed information on the sectoral composition of demand using harmonized sectoral classifications. The second are cross-country compilations of consumption baskets, such as the one undertaken by the World Bank's International Comparison Program, a statistical initiative that collects national prices of a well-defined basket of goods and services for most countries (Duarte 2017).[5] A similar initiative is the World Bank's recently released Global Consumption Database, which focuses on emerging industrial and developing economies.[6]

Data from these sources reveal that manufacturing plays a much bigger role in consumption than in GDP or employment. Data coming from international input-output tables indicate that manufacturing accounts for about 30 percent of world consumption, while data collected by the International Comparison Program suggest that manufactured goods account for more than half of world consumption (Figure 1.6).[7] These figures are two to three times larger than the share of the sector in world employment or GDP, and stress the prime role played by manufacturing industries bringing a wide array of consumption goods to the world.

The benefits of affordable variety: Increasing consumer welfare, driving income creation and industrialization, and contributing to sustainable development

Manufacturing industries provide a growing variety of goods at prices that have declined relative to other sectors of the economy. That is, they provide "affordable variety." Creating new manufactured goods, upgrading the quality of existing goods and reducing

Figure 1.6
Manufacturing: A key provider of goods for private household consumption



Note: All values are for 2011 and in current $. Values are unweighted averages of all countries included in each source. In the World Bank International Comparison Program dataset, manufacturing consumption is defined following the approach put forth in Duarte (2017) (see also Annex C4, Table C4.1). For the manufacturing sector classification, see further Annex C2, Table C2.2 and C2.3.
Source: UNIDO elaboration based on Eora Multi-Region Input-Output database (Lenzen et al. 2012; Lenzen et al. 2013), OECD (2017c) "Inter-Country Input-Output Tables, 2016 edition," oe.cd/icio, (accessed on September 6, 2017) and the 2011 International Comparison Program dataset (World Bank 2015).

"The decline in manufacturing prices has been among the most significant drivers of overall welfare since the early stages of industrialization

the relative prices of manufactures has a clear positive impact on people's daily lives.

What are the mechanisms that link the availability of affordable and varied goods to consumption and human welfare? How does industrial development drive and shape these mechanisms? Three pillars—increasing consumer welfare, driving income creation and industrialization, and contributing to sustainable development—hold the answer.

The next subsection looks at how the provision of affordable variety affects consumer welfare, without identifying the beneficiaries of such welfare gains or the types of goods provided. The following subsection examines the dynamic forces that drive this process and the extent to which all countries can benefit from it. It analyses how the creation and consumption of affordable variety relates to industrial development and can give rise to a virtuous circle of welfare and income generation. The last subsection examines how affordable variety contributes to achievement of the SDGs.[8]

New, better and more affordable goods increase consumer welfare

The decline in manufacturing prices has been among the most significant drivers of overall welfare since the early stages of industrialization.[9] As a result of technological progress, prices for consumer goods have experienced a long-term downward trend over the past century that has contributed to an unprecedented improvement in purchasing power and a widening of the range of consumption options (DeLong 2000, Jong 2015).

Consumers' rising purchasing power can be captured by looking at how many hours of work it takes an average worker to buy a given good. In 1895 it took the average American worker 260 work hours to be able to buy a one-speed bicycle. By 2000 that figure had fallen to just 7 hours—less than 3 percent as long (DeLong 2000).

Reduction in the price of existing goods is just one way in which manufacturing has improved individuals' welfare. Another is by producing new types of goods (such as radios, aspirin, computers, smartphones). The creation of new goods of better quality has held down the true cost of living, raising living standards by much more than conventional measures indicate (Jong 2015).

Beyond the anecdotal evidence from historical records, substantial empirical work has been done to quantify the welfare implications of affordable variety by estimating how much consumers are better off as a result of declines in the relative price of the goods they are already consuming; improvements in the quality of goods they are already consuming that are not reflected in prices; the introduction of new goods, for which there were no substitutes before; and overall increases in the number of options (increased variety).

The standard approach to capturing the effect of price reductions on consumer welfare is to estimate the demand curve for a specific good and measure the changes over time in "consumer surplus"—the difference between what consumers are willing to pay and the actual price on the market. A traditional example of this approach is the analysis of how improvements in the technology used to spin cotton yarn into thread affected the price of cotton fabric—and welfare—in the early 19th century. Invention of the spinning mule (by Samuel Crompton, in 1779) and other efficiency gains pushed down the cost of producing cotton yarn in the United Kingdom by 90 percent between 1784 and 1819. Leunig and Voth (2011) find that the fall in the price of cotton yarn generated a welfare gain to consumers equivalent to about 6 percent of their consumption expenditure by 1820.

Estimating the welfare gains from improved quality is more complicated, because a "price" needs to be associated with changes in quality. Some researchers apply the concept of "hedonic pricing," which assumes that the price of a marketed good is related to its characteristics or the services it provides. Changes in quality may be captured by changes in certain attributes of the product. With cars, for example, one attribute is engine power. When a car's engine power improves, the value (or "price") of the car rises. If the market price of the car remains the same, the quality-adjusted

“The interactions between demand and production can create a virtuous circle of development that fuels the income needed to purchase new, and better, goods

price falls. This decline is not observed in the market, but it still increases consumers' welfare.

These gains can be measured by estimating demand curves. Raff and Trajtenberg (1996) examine quality improvements in three attributes of automobiles between 1906 and 1940. They find that these improvements were equivalent to a 2 percent annual reduction in the real price of cars.

Access to new goods is also, in itself, a source of consumer welfare. One way of estimating the effect of new goods on welfare gain is to posit that the new good existed before its introduction to the market but with a virtual price that was so high that no consumer would buy it. In such a case, the welfare gain would be equivalent to the gain associated with a price reduction from the high virtual price—at which consumption can be assumed to be equal to zero—to the price at which the good is introduced into the market (Creedy 2015). This method has been used to estimate the consumer welfare gains of a wide array of goods, including cereal brands (Hausman 1996), personal vehicles (Petrin 2002) and personal computers (Greenwood and Kopecky 2013). Researchers have found welfare gain for consumers in all cases, which are higher the more radical the new good is. The case of personal computers is quite illustrative in this regard. Greenwood and Kopecky (2013) calculate the welfare effect of the introduction of the PC and subsequent product improvements, using quality-adjusted price deflators. They find the impact of the PC between 1977 and 2004 was equivalent to 3 percent of total consumption expenditure.

Several researchers have identified a positive correlation between increases in the variety of imported goods and welfare (Broda and Weinstein 2004 and 2006, Chen and Ma 2012, Mohler and Seitz 2012). Broda and Weinstein (2004 and 2006) find that access to a wider variety of imports was associated with an increase in consumer welfare equivalent to 2.2–2.6 percent of real income in the United States between 1970 and 2000. Chen and Ma (2012) estimate the welfare gain resulting from access to imported variety to be equivalent to 4.9 percent of China's GDP between 1997 and 2008. Using a similar approach, Mohler and Seitz (2012) find high gains in welfare from newly imported varieties in countries from the European Union between 1999 and 2008.

Manufacturing consumption can be a powerful driver of industrial development and income creation

The interactions between demand and production can create a virtuous circle of development that fuels the income needed to purchase new, and better, goods. To fully capture the effects of industrial development on people's daily lives one needs to take into account the interlinkages between the creation of affordable variety, the generation of incomes and the continuous transformation of the economy.

The immediate effect of an increase in the affordability of manufactured goods is an increase in the share of income households can allocate to other goods. The way in which this additional income is allocated depends on the initial level of income. Poor households allocate most of their income to basic needs, such as food and shelter. As their income grows, they are able to allocate part of their additional income—the discretionary income—to other types of expenditures.

Historically, industrial development was vital in creating a critical mass of discretionary income, which set in motion an unprecedented process of creation of new varieties and qualities of goods (Saviotti and Pyka 2013). Until the end of the 19th century, most people spent most of their income on necessities. The ability to purchase higher-quality goods and services required discretionary income, which emerged only through the growing efficiency—in the production of existing goods—enabled by the industrial revolution.

Income gains are associated with changes in consumption patterns. The German statistician Ernst Engel postulated a non-linear relationship between average incomes and the share of different categories of goods in consumption baskets (Engel 1895). Some goods (such as cars, motorcycles, or jewellery) tend to increase more than proportionally as income rises;

"As more people are able to access them, luxuries become necessities, and demand for these products is 'massified'

consumption of others (such as food and beverages, clothing, or footwear) tends to decline, leading to a continuous process of diversification in demand.

Diversification of demand, in turn, leads to the emergence of new industries and the creation of new varieties in the economy, a key requirement for long-term economic development (Saviotti and Pyka 2004). As new manufacturing industries consolidate, they gain scale and increase efficiency (through process and managerial innovations), initiating a process of cumulative growth. Learning dynamics and the development of large intra-sector linkages accompany the expansion of manufacturing production, leading to further improvements in scale and efficiency (Kaldor 1967). Productivity—in the sector as well as the economy as a whole—accelerates as a result.

Gains in productivity in established industries tend to reduce the prices of goods that were originally affordable for only a few. As more people are able to access them, luxuries become necessities, and demand for these products is "massified," creating new opportunities for firms serving that demand. Process innovations reduce manufacturing costs and enable firms to tap mass consumption markets, while, at the same time, mass production facilitates process innovations by increasing learning-by-doing and specialization benefits. Productivity and mass consumption are therefore linked in a virtuous circle (Foellmi et al. 2014, Matsuyama 2002).

In an influential analysis of 50 product categories, Tellis and Golder (1996) hypothesize that when a new product is introduced, it has low quality, a high price and few applications, limiting sales to certain market segments. In their view, it is the process of tapping the mass market that provides the needed economies of scales and experience to raise quality, lower prices and increase applications (Box 1.2). This dynamic characterized the diffusion of several types of consumer goods in many industrialized economies after World War II, including vacuum cleaners, washing machines, telephones, televisions, cars and air conditioners.

After goods have diffused across all consumers, inter-firm competition and the introduction of new innovations lead to a further drop in prices. These

Box 1.2
Tapping the mass market for film, video recorders and disposable nappies

Historically, the success of new consumer products—and the industries they spawn—has hinged on innovators' ability to foresee the emergence of a large market for their products. Several examples illustrate how the profit opportunities provided by the mass market shape diffusion processes.

During the 19th century, photography remained restricted to professionals and to amateurs who could afford the equipment and master the technical complexities. George Eastman's invention of photographic film, in 1889, created a mass market for photography. Thanks to his innovation, more and more people could take pictures, remove the exposed film from the camera and obtain finished prints from a local photographer or specialized factory. By turning a niche product into an item of mass consumption, Eastman revolutionized the social role of photography.

The first commercial video recorders were introduced in the United States in 1956, by Ampex, which remained the leading supplier for several years. The high initial price ($50,000) constrained sales. JVC, Matsushita and Sony saw the mass market potential of this product and devoted millions of dollars to research on bringing it to market. After 20 years of research and innovation, by mid-1970 they did so. Over the next 20 years, annual global sales of video recorders rose from $2 million to almost $2 billion at JVC, from $6 million to $3 billion at Matsushita and from $17 million to almost $2 billion at Sony. Over the same period, sales by Ampex increased only marginally, from $300 million to $480 million.

Disposable nappies (diapers) have been available in the United States since 1935, but the products marketed by pioneer firms, such as Chux of Johnson & Johnson, were expensive. Sales therefore remained limited to wealthy households until the mid-1960s. Recognizing the mass market potential of a high-quality and affordable product, Procter & Gamble launched a cheaper brand, Pampers. By 1966, after 10 years of research, Pampers were marketed at about 5.5 cents a nappy. Over the next seven years, the United States' market for disposable nappies expanded from $10 million to $370 million a year. Procter & Gamble had created a mass market.

Source: Tellis and Golder (1996).

"Competition and innovation lead to reductions in prices in mass consumption products, augmenting the purchasing power of all consumers

declines increase the purchasing power of the vast majority of consumers, allowing them to allocate more discretionary income to new varieties of non-essential manufactured goods.

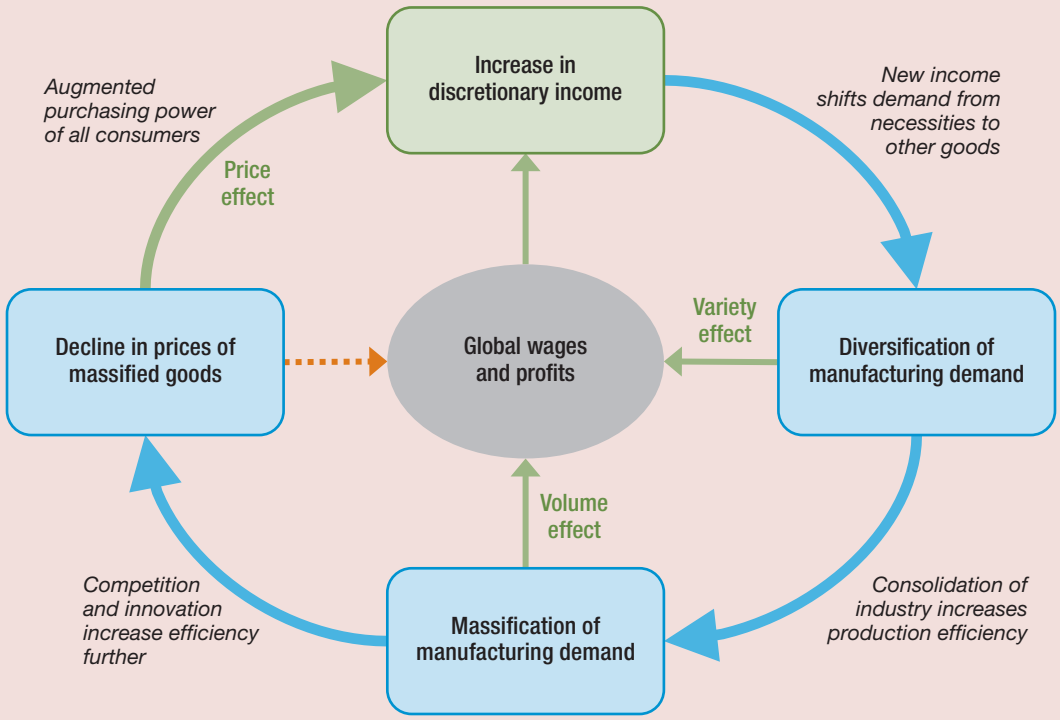
Figure 1.7 illustrates this process. An increase in discretionary income sets in motion a series of interrelated effects that foster income gains and welfare through the consumption and production of manufactured goods. First, demand diversifies from necessities into other "superior" goods, creating new opportunities for the emergence of new industries.[10] Second, the new industries consolidate; improve production efficiency; and reduce prices, enabling the mass consumption of their products and creating new opportunities for income creation as the size of production expands. Third, inter-firm competition and innovations lead to further reductions in prices in mass consumption products, augmenting the purchasing power of all consumers and keeping the circle turning.

New income is created through three main channels:

- Variety effect: Demand for new goods increases the income of workers and entrepreneurs directly and indirectly involved in the industries that emerge to serve these new demands.
- Volume effect: Demand massification of existing goods increases the income of workers and entrepreneurs directly and indirectly involved in the industries that serve these enlarged demands.
- Price effect: The decline in the prices of mass consumption goods improves the purchasing power of all consumers, increasing their discretionary income.

This simplified framework holds when one looks at the global economy as a single entity. The picture becomes more complex once one takes account of the fact that production and consumption are not necessarily located in the same economic area. Mechanisms

Figure 1.7
The virtuous circle of manufacturing consumption: The global economy



Source: UNIDO elaboration.

"The inclusiveness of the virtuous circle depends on the extent to which different countries benefit from the income-generation mechanisms

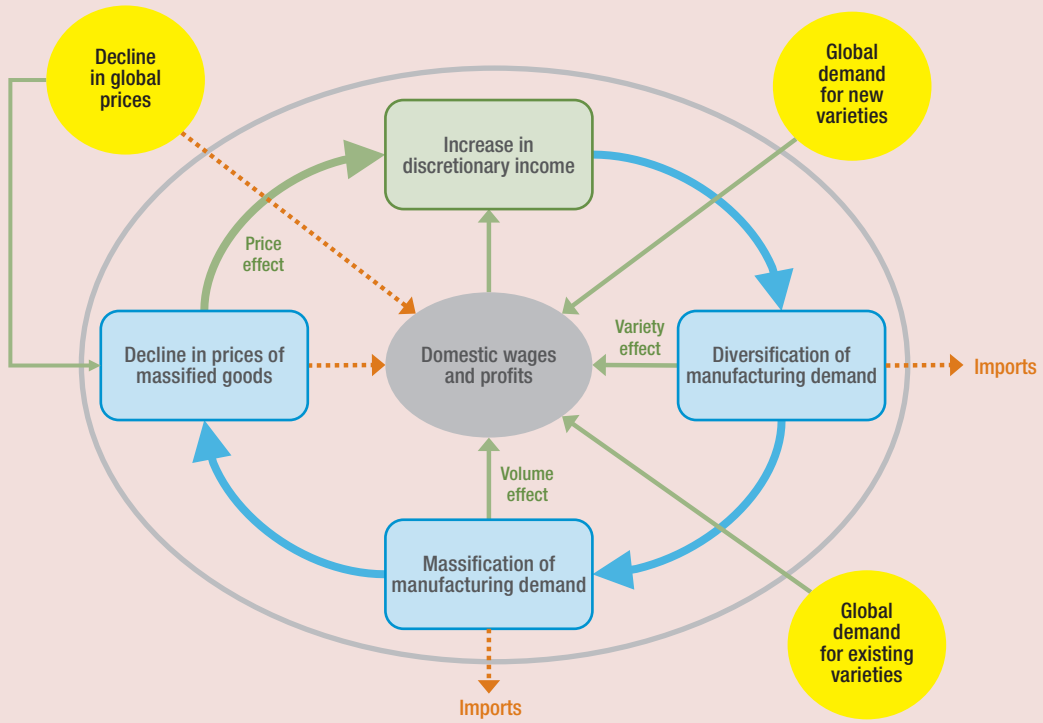
can leak (or inject) new income and demands outside (or inside) the domestic economy. Figure 1.8 illustrates these mechanisms by representing an individual economy (the part of the figure that is inside the grey oval) circumscribed within a global economy (represented by the bubbles outside the grey oval).

Domestic demand can leak towards foreign production (imports) of new or existing varieties of goods (as captured by the red dashed lines pointing outside the grey oval). Declines in the global prices of domestically produced manufactured goods can reduce the nominal income created in the domestic economy if the country exports those goods (red dashed line connecting the decline in global prices with the domestic wages and profits). However, global demand can also be a powerful source of income for the domestic economy, taking the form of either injections of demand for both new and existing varieties of goods (as shown by the corresponding green solid arrows) or increases in the purchasing power of domestic consumers thanks to imports of cheaper goods from abroad (green solid arrow connecting global and domestic prices).

The inclusiveness of the virtuous circle of manufacturing consumption depends on the extent to which different countries benefit from the income-generation mechanisms of the circle. If some countries are left out of this dynamic process, the circle cannot be regarded as inclusive from a global perspective. If the benefits from this process are concentrated among a small portion of households or regions within countries, the potential to drive social inclusiveness at the country level will be greatly undermined. Chapters 2, 3 and 4 examine these issues in further detail.

Even if the circle is inclusive, a vital question remains: Is it environmentally sustainable? Increased consumption of manufactured goods certainly leads to further environmental degradation. Hence, it is also necessary to examine whether and under what

Figure 1.8
The virtuous circle of manufacturing consumption: The domestic economy



Source: UNIDO elaboration.

“The diffusion of less expensive consumer goods increases the purchasing power of all consumers, including consumers at the bottom of the pyramid

conditions the consumption of manufacturing can be sustainable, a key issue analysed in Chapters 5.

Affordable variety contributes to the SDGs

The analysis so far risks conflating welfare with the mere expansion of consumption options, irrespective of what those options may be.[11] Greater consumption may entail reliance on environmentally, or socially, damaging production processes. Should it lead to the depletion of non-renewable natural resources, it may violate the principle of inter-generational equality. These issues have led to broader definitions of welfare.[12]

Nussbaum (1992) and Sen (2001) define welfare not by a mere increase in the ability to consume but by the expansion in opportunities that consumption enables. From this perspective, affordable variety matters because it enables consumers to seek goods that may help them lead healthier, more satisfying and more informed lives.

When welfare is understood in broader terms, the quality of consumption matters. Two considerations are particularly relevant. The first is whether consumers are given enough assurance about the safety of the products they buy. The introduction of norms and standards can lead to stricter control over products and value chains, to the benefit of consumers. The second is the extent to which production processes are resource efficient, clean and climate resilient. A welfare perspective requires that the social and environmental impact of any given consumption choice be considered.

Availability of, and equitable access to consumer goods that are safe to use at reduced, or zero, social and environmental impact is central to the 2030 Agenda for Sustainable Development. That agenda recognizes the need for countries to acquire strong productive and technological foundations (SDG 9) in order to ensure equitable access to consumption, but stresses that the environmental impact of current patterns in manufacturing production and consumption needs to be drastically reduced, an objective of SDGs 9 and 12 (“Ensure sustainable consumption and production patterns”).

Providing access to the bottom of the pyramid

Poverty is a multidimensional condition caused by multiple inter-related factors. The SDG 1 targets highlight that deprivation is characterized by a lack of disposable income as well as poor health; lack of education; poor quality of work; lack of political influence; and extreme vulnerability to violence, climate-related events and other economic, social and environmental shocks (Alkire and Santos 2013).

Underlying all characteristics of living on less than $1.90 a day (the international poverty line) is the inadequacy of consumption options. Even when they are willing to pay for them, the poor have less access to basic consumer goods and services than wealthier groups (Banerjee and Duflo 2007, Prahalad and Hart 2002). In addition, the goods and services that are available may be expensive, hazardous, and environmentally unsustainable. These factors may reinforce one another, triggering a vicious circle of poverty and ill-being. In countries where medicines are costly, for instance, lack of disposable income can translate into poor health and vice versa. Reliance on solid fuels for domestic heating and cooking in many rural areas in low- and middle-income countries is damaging to both health and the environment.

The diffusion of less expensive consumer goods increases the purchasing power of all consumers, including consumers at the bottom of the pyramid. The higher real income from increased affordable variety can help lift some poor households above the poverty line. The provision of affordable variety is therefore one additional channel by which industrial development contributes in poverty alleviation.[13]

The price effect is reinforced when product or process innovations are designed to address lower-income groups. Partly as a result of greater liberalization in low- and middle-income economies since the 1990s, there has been an increase in market-based strategies to deliver goods and services to the poor (Ramani et al. 2009). Access to sanitation is a long-standing need in areas traditionally neglected by public and private sector providers alike. Innovations such as the Sulabh and Calvert toilet models pioneered in India

"Lower prices may enable households to expand and diversify their dietary intake, leading to improved nutrition

are environmentally sound solutions that meet the requirements of lower-income consumers (Ramani et al. 2012, Kothandaram and Vishwanathan 2008).

Synergies between affordable variety and the SDGs are also evident in the production of low-cost generic medicines by pharmaceutical firms in low- and middle-income countries. In the Philippines, local firm RiteMed distributes affordable generics in a market previously dominated by high-cost brand drugs. By 2007 RiteMed had carved out a significant share of the market by providing quality-assured generics at a fraction of the price of brand-name medicines (Ganchero and Pavia 2007). Other examples of bottom of the pyramid innovations include rural sales programmes that deliver a host of manufactured items—ranging from soap to SIM cards—that were previously unavailable or too costly, at affordable prices (Dolan et al. 2012).

Innovation has also transformed durable consumer goods such as cars, generators and computers from inaccessible luxuries into items that may be within the reach of lower-income households. India's Tata Nano, the world's most affordable car, went on the market in 2009 at a retail price of about $2,000. This "frugal" innovation enabled steep reductions in price while focusing on functionality by combining existing component technologies to produce a modular product (Ray and Kanta Ray 2011). The car responded to heavy demand for affordable vehicles from consumers who had been able to afford motorbikes but not cars.

The Nano is not as fuel efficient as other, more expensive products (or the motorbikes consumers used before its introduction). Trade-offs can therefore arise between protecting the environment and ensuring that innovations remain accessible to lower-income consumers (see Chapter 6).

Innovations directed at the bottom of the pyramid need not be environmentally damaging. One example is renewable energy mini-grid technology, which provides power to rural villages at affordable prices (Eder et al. 2015, Singh 2016). Innovations at the bottom of the pyramid can also increase social inclusiveness, as in the case of Beijing-based Tsinghua Tongfang, which markets affordable computers designed for rural users, helping bridge the digital divide between rural and urban areas in China (Li and Zhou 2007).

Promoting food security

Food security can be defined by five elements: the availability of food in local markets; access to food by all households, in urban and rural areas; elements effective utilization of food in the household; elements stability of the domestic food supply; and elements sustainability of the food system on which all these components depend (Timmer 2017).

Price is a fundamental determinant of access to food. It works in two main ways. First, lower prices of all consumer goods increase the amount of money households can allocate to food. They may also enable households to expand and diversify their dietary intake, leading to improved nutrition—a component of welfare that features prominently in SDG 2.[14]

Second, affordable variety can reduce the price of food. A reduction in prices of agricultural products may occur as a result of productivity increases in the rural sector that accompany technological change in manufacturing. The increased use of agricultural machinery (Pingali 2007, Steckel and White 2012) and fertilizer can increase food security.[15]

There is, however, tension between greater consumption possibilities and environmental sustainability. Rising demand for food contributes to greenhouse gases emissions and puts pressure on land, freshwater resources and the ecosystem, with potentially dire consequences.

Changes in demand and consumer perceptions can help shape the circle of manufacturing consumption and industrial development in the direction of greater sustainability and safety. More stringent quality and safety standards along the food value chain have improved consumer welfare (Box 1.3). This trend is observed in large emerging industrial economies, such as China, where decades of rapid industrialization and urbanization are driving the preferences of a growing niche of consumers towards higher-quality, safer and less environmentally damaging products (Ely et al. 2016, Garnett and Wilkes 2014) (see Chapter 5).

"Improving access to medicine is not just about price and availability; critically it also requires that medicines are of high quality

Box 1.3
Enforcing standards in food products

Consumers in high-income markets are increasingly concerned with the quality, safety and provenance of food products, leading to the emergence in recent years of a plethora of standards regulating trade in agricultural products.[1] Food standards play a key role in transmitting credible information to consumers with regards to the quality of the products they purchase, as well as on the conditions under which these are produced, processed and transported. In this context, compliance with food safety and quality standards is increasingly considered as a prerequisite for food exporters in developing countries to tap into foreign markets (UNIDO 2015c).

Yet achieving full compliance with international standards and regulations can be a daunting prospect, as these affect the entire value chain, from inputs down to processing and packaging. Exporters need proof that their products conform to international requirements from internationally-recognized institutions, which in low-income countries are often resource-constrained or, in some instances, absent. Reliance on service-providers in buyer or third countries can be a costly and time-consuming process. Lack of access to local technical expertise can therefore limit the achievement of a comprehensive quality management system, with negative consequences on firms and consumers alike.

Against this backdrop, UNIDO has developed a comprehensive programme to help developing economies to overcome the shortcomings of their quality infrastructure. Services range from establishing standardization and certification bodies to capacity building in industrial metrology and product testing. One example is UNIDO's support in increasing standard compliance within four of Ghana's key agro-industrial value chains (fish products; fruits and vegetables; cocoa; and wood products). UNIDO's intervention led to the development of national quality and safety standards. Local laboratory testing capacity was also established, alongside a product traceability system to increase market confidence.

Exports can now be traced back to the farm, enabling rapid identification of the source of any noncompliance with standards and safety requirements. Local producers receive reliable certification services for ISO 9001 and ISO 22000 (quality standards by the International Organization for Standardization [ISO]) management systems at affordable prices. Moreover, inspections of product safety are now conducted in line with best international practice. Ghana's quality infrastructure thus ensures that food safety standards are respected at all stages of the value chain—at a lower cost for producers than was previously the case. This constitutes evidence that there is an important role to play for governments and international partners in facilitating compliance with standards thus enhancing both food security and economic competitiveness.

Note
1. Food standards are traditionally set and enforced by national authorities, following the guidelines of international standard-setting bodies. Recent years, however, have witnessed a rise of private and voluntary standards introduced by multinational corporations, civil society organizations, as well as non-profit organizations. Schematically, public and private standards differ in that lack of compliance with the former may be addressed through criminal or administrative courts, whereas private standards are enforced through certification bodies instead. Still, non-compliance with private standards can lead global retailers to refuse contracting with suppliers that are unable to obtain the necessary certifications. Thus private standards, while by definition voluntary, may in fact become mandatory (UNIDO 2015c).

Providing access to quality-assured medicines

In many low- and middle-income countries, millions of people lack access to essential medicines. Public health facilities may provide generic medicines for free or at a very low cost, but their availability appears to be low (Kaplan and Mathers 2011). Where social health insurance schemes exist at all in low-income countries, their coverage of medicine is limited (Cameron et al. 2012). As a result, consumers have to pay out of pocket at private facilities, where prices are high, forcing many to forgo treatment or be pushed under the poverty line.[16]

Improving access to medicines is not just about price and availability; critically it also requires that medicines are of high quality. The quality of the product has profound implications regarding the effectiveness of treatment, the occurrence of cross contamination that can lead to severe adverse events, as well as the emergence of resistance against certain drugs. Yet according to estimates by the World Health Organization (WHO), up to 25 percent of medicines consumed in developing countries are sub-standard (WHO 2003b). The rate of sub-standard products can exceed 60 percent for certain life-saving drugs, such as anti-malarial medicines, in certain countries (WHO 2011).

Inadequate adherence to international standards by pharmaceutical manufacturers and weak quality control systems at the national level are critical factors in explaining the prevalence of sub-standard

"The development of home appliances like washing machines and vacuum cleaners sharply reduced the time women needed to spend on household production

and counterfeit products on developing country markets, with dire effects on the welfare of consumers (Box 1.4). It is worth noting that low quality equally affects locally manufactured medicines and imports (Bate 2010). This is a particularly worrisome pattern in lower-income countries where imported medicines satisfy a large part of domestic consumption.

Improving domestic capabilities to produce generics in countries with established pharmaceutical industries may help increase equitable access to essential medicines (Banda et al. 2016).[17] Provided that pharmaceutical firms adhere to the WHO's Good Manufacturing Practices (GMP), increasing local production could help provide good- quality generics at affordable prices (UNIDO 2012). Whether local production would be beneficial to consumers remains in doubt, however, with critics arguing that local production in countries with limited infrastructure and human capital is likely to entail higher prices and therefore hamper access (Kaplan 2011).

Data on GMP-compliant manufacture of essential medicines in low- and middle-income countries are scarce. Estimates suggest that despite the cost disadvantage local producers may face against established manufacturers, domestic production of generics can be viable, even with relatively small domestic markets (Chaudhuri and West 2015). Regional initiatives, innovative public procurement policies and regulatory reforms can go a long way in supporting local production of generics (see Box 6.4 in Chapter 6).

Affordable variety, time use and gender equality

Gender disparities in access to resources and opportunities persist in all country income groups and regions. Indeed, as recognized by the international community with the adoption of SDG 5, the lack of gender equality in education, health outcomes, earning opportunities and political participation is a major barrier to human and economic development (Sen 1990, World Bank 2012a). Affordable variety can help reduce gender disparities.

Gender inequality takes many forms. The persistence of gendered norms about what type of activities women, as opposed to men, should perform has important implications for employment and earning opportunities (Duflo 2012). The fact that women are generally expected to take on the bulk of housework and home-caring responsibilities leads to lower discretionary time that can be allocated to paid work. Lack of access to paid employment can reinforce women's dependence on male relatives and constrain opportunities to access the public domain and make their voices heard in the political sphere (Kabeer 1999).

Partial automation of home-based tasks allows households to allocate fewer resources to household production. The discretionary time released can be spent on other, market-oriented activities (Becker 1965, Woersdorfer 2017).[18]

In industrialized economies electrification, the expansion of access to running water and the development of home appliances like washing machines and vacuum cleaners sharply reduced the time women needed to spend on household production (Gordon 2016), allowing them to engage in paid work outside the home. The impact of time-saving innovation was not felt immediately, however. Over the short to medium term, it seems to have resulted in a different composition of household work rather than a shift to market work. Over time, improvements in household technology appear to have greatly reduced the gender gap in employment in industrialized economies.

Estimates of the impact of affordable household technology in the United States, for instance, suggest that technological progress in household goods may account for over half the observed rise in female labour-force participation in the country between 1900 and 1980 (Greenwood et al. 2005, see also de V. Cavalcanti and Tavares 2008). Data on developing and emerging industrial economies are scarcer, yet one recent study of the impact of rural electrification in South Africa finds that improved access to electricity might have led to an increase in 9.5 percentage points in female employment (Dinkelman 2011).

With regards to the impact of modern household appliances on the gendered distribution of unpaid housework within the household, however, evidence

"UNIDO helps countries developing a commercially viable pharmaceutical sector that adopts manufacturing practices of internationally acceptable quality

Box 1.4
Enforcing quality standards in medicines

Consumer demand for quality-assured medicines is growing in many developing and emerging economies. While commercially viable pharmaceutical industries in several low- and middle-income countries could, in principle, tap into the domestic market, the quality of their products is often not in line with internationally acceptable GMPs, such as those laid out by WHO. Inadequate adherence to, and enforcement of, standards for imported and locally produced drugs is therefore a major reason for the prevalence of sub-standard medicines on developing country markets.

Achieving international GMPs for finished formulations, however, can be a daunting prospect given it covers all aspects of the production process from sourcing of raw materials all the way through production and quality assurance to final release of the product. Achieving GMP requires investment in infrastructure and developing comprehensive quality management systems and documentation throughout the production process. Thus a lack of access to affordable capital and the technical expertise to implement upgrading programmes can limit the ability of manufacturers to strive for international standards. Evidence suggests that low-cost generics imported from emerging industrial economies tend to lack sufficient quality credentials (see, for instance, Bate 2010). So, the solution to the problem is not to resort to imports; if anything, this further compounds the issue.

Resource constrained regulators face a huge challenge to oversee the quality of products produced from numerous plants (often in the thousands) across different geographies around the globe. WHO estimates that only about 20 percent of its 190 member states have well-developed medicine regulation in place (WHO 2003a). Supporting the industry in close proximity to the market to reach international standards would provide National Medicines Regulatory Authorities (NMRAs) with a source of supply that they can more realistically provide proper oversight to. While the WHO prequalification scheme provides quality assurance for products supplied using large international donor financed procurement funds, it only covers specific classes of essential medicines.[1] Oversight on all other products used on a daily basis by consumers depends on the NMRAs.

Against this backdrop, UNIDO helps countries devise strategies for developing a commercially viable pharmaceutical sector that adopts manufacturing practices of internationally acceptable quality. A key component of UNIDO's approach is the GMP Roadmap, consisting of a risk-based, phased approach to support pharmaceutical companies in their transition towards full compliance with infrastructure requirements and quality management systems. The approach seeks to harmonize the urgent need for improving existing manufacturing standards with the recognition that the transition to full GMP compliance is time-consuming. So, the early focus is on addressing the least compliant, high-risk areas first—with subsequent phases having clearly defined milestones and targets (UNIDO 2015d).

A risk-based, stepwise approach results in a viable and scientifically sound pathway towards full GMP compliance. The benefits are multiple. Adopting a transition process characterized by clearly defined requirements, activities and milestones ensures a level playing field throughout the various phases of implementation. Supporting companies to develop corrective action plans enables risk mitigation while upgrading takes place. Moreover the stepwise process increases the willingness of actors within the industry to implement GMP. It also increases transparency during licensing procedures and regulatory inspections, thereby helping to strengthen national regulatory authorities (UNIDO 2015d).

Over the medium to long run, implementation of the Roadmap will result in a significant reduction of sub-standard products on the market. Initially developed for Kenya in consultation with industry stakeholders (UNIDO 2014a), the approach has been generalized and readied for tailoring to individual country contexts. It is, for instance, a key constituent of the package of solutions put forward by the Pharmaceutical Manufacturing Plan for Africa (PMPA) Business Plan—a partnership between UNIDO and the African Union Commission. UNIDO is currently working with the West African Health Organization (WAHO) to a framework for the Economic Community of West African States (ECOWAS) region, based on the GMP Roadmap methodology that will provide a consistent basis for upgrading the industry and monitoring its progress across the member states. This is a cornerstone of WAHO's ECOWAS Regional Pharmaceutical Plan.

Note

1. The programme consists of an assessment process that, in conjunction with other procurement criteria, is used by UN and other agencies to make purchasing decisions on medicines to safeguard consumers. The Prequalification Programme covers more than 350 finished pharmaceutical products and more than 20 active pharmaceutical ingredients. The programme initially focused on quality-assured low-cost generic versions of medicines to treat HIV, tuberculosis and malaria. But it has evolved over the years to include other essential medicines for reproductive health, diarrhoea and neglected tropical diseases.

"Through the lenses of consumption, manufacturing emerges as the key sector of the global economy

can be ambiguous. Some researchers find, rather surprisingly, no reduction in women's unpaid housework from greater availability of household appliances in some industrialized economies (Bittman et al. 2004, Offer 2006).[19] Others point out that such devices are hardly relevant to poor women from developing countries that live in areas lacking water and electricity (Mitter 2004).

By increasing the discretionary time at the disposal of women and men, the provision of affordable variety therefore can, under the right circumstances, help to achieve the objective of reducing the burden of unpaid domestic work and care, directly contributing to SDG 5 (particularly targets 5.4 and 5.5).[20] However, by itself, greater access to time- and labour-saving technologies does not necessarily alter the gendered division of unpaid household work within the household. Complementary strategies, such as the increased provision of care services, need to be in place to improve labour market outcomes.

The above discussion indicates that through the lenses of consumption, manufacturing emerges as the key sector of the global economy, because it is a major provider of new varieties and qualities of goods that, over time, became cheaper and affordable for everybody. As discussed in the chapter, the provision of new varieties and qualities of goods, which are affordable for all, raises living standards and improves welfare of consumers. Moreover, it plays a prime role in the achievement of several SDGs, including poverty alleviation, food security, access to medicines and gender equality.

The chapter also stressed the important interactions that exist between demand and supply. Due to these interactions, the consumption of manufactures is a prime driver of industrial development and income creation, as represented in the virtuous circle of manufacturing consumption. The next chapter examines and describes in further detail the different mechanisms in play along the virtuous circle of manufacturing consumption, as well as the main challenges and opportunities that this circle can bring to countries at different stages of development.

Notes

1. According to Prahalad (2006), who coined the term, the bottom of the pyramid includes people living on less than $2 a day.
2. Chapter 7 presents all trends analysed in this section, distinguishing between countries at different levels of industrial development.
3. When looking at real values, the relative size of manufacturing depends heavily on the base year used to fix prices. Here, the common practice of basing prices on a recent year (2010 in Figure 1.5) is followed, so that they reflect today's reality.
4. These initiatives include the Eora Multiregional Input-Output database (www.worldmrio.com), the Global Trade Analysis Project Database (www.gtap.agecon.purdue.edu), the IDE-JETRO Asian Input-Output Tables (www.ide.go.jp), the Inter-Country Input-Output Tables (http://oe.cd/icio) by the Organisation for Economic Co-operation and Development and the World Input-Output Database (www.wiod.org). This chapter draws on the information provided by the Eora Multiregional Input-Output database and the OECD Inter-Country Input-Output Tables, which have the broadest coverage in terms of countries.
5. See www.worldbank.org/en/programs/icp.
6. Chapter 2 provides details on this dataset. One of its major advantages is that it disaggregates data by income segments within countries.
7. Whereas international input-output tables are based on national accounts statistics, the World Bank International Comparison Program database is based on household expenditure surveys. That explains the large difference between the first two bars of the figure and the last one. National accounts–based statistics impute the "consumption" of household services. Expenditure surveys do not, possibly increasing the importance of

manufacturing goods. The sectoral disaggregation used in both sources is typically different, as national accounts use industry-based classification whereas household surveys use consumption-specific classifications. The definition of manufacturing in household surveys is not straightforward. In national accounts, for example, food items are defined as agricultural or manufactured goods depending on whether they were processed. This distinction cannot be made in data from household surveys, and all food items need to be classified as manufactured goods, possibly increasing the importance of manufacturing. For these reasons, inclusion of both sources in Figure 1.6 is only illustrative, intended to show that the importance of manufacturing increases when the focus is on final private consumption.

8. For details on the United Nations Agenda 2030, see https://sustainabledevelopment.un.org/post2015/transformingourworld.
9. This section draws on de Macedo et al. (2017).
10. Superior goods are characterized by an income elasticity that is greater than unity. See Chapter 2.
11. This section draws on de Macedo et al. (2017).
12. See Dowding (2009) and Gasper (2007) for comprehensive reviews of welfare in economics and moral philosophy.
13. The treatment in this section is not exhaustive. Industrial development can reduce poverty through several other mechanisms. For a comprehensive discussion of the relationship between industrialization and poverty alleviation see Lavopa and Szirmai (2012) and UNIDO (2015b).
14. Dietary transitions need not result in positive health outcomes. Greater varieties of food may be high in sugar, fats and oils, leading to increases in obesity and other chronic diseases (Webb and Block 2012). The introduction of public health interventions such as behavioural incentives ("nudges") can contribute to shaping consumption and dietary patterns.
15. Over the long run, food prices appear to have decreased relative to the price of overall consumption, thanks to industrialization and rising agricultural productivity. Over the short term, other factors affect food prices. The recent boom in commodity prices, for instance, seems to have driven up the relative prices of foodstuffs. Climate change also affects food prices over the short to medium term (see FAO 2016).
16. The median ratio between local prices and international reference prices (the lowest prices at which medicines are bought and sold internationally) for the same basket of generic medicines ranges from 6.7 for Sub-Saharan African countries to 9.5 for countries in Latin America and the Caribbean (Kaplan and Mathers 2011).
17. In 2014 the heads of the Joint United Nations Programme on HIV and AIDS (UNAIDS), UNIDO and the WHO jointly advocated increasing local production of medicines in Sub-Saharan Africa and called for harmonizing industrial and public health policies (see Sidibé et al. 2014).
18. The treatment in this section is not exhaustive. Industrial development can reduce (or, in some instances, increase) gender disparities through several other mechanisms. For a comprehensive discussion of the relationship between industrialization and gender equality, see Fontana (Forthcoming). For a discussion of the impact of industrial development on patterns of employment by gender—the "feminization" of the labour market in emerging industrial economies in the context of the increasing fragmentation of production—see Standing (1989) and Kucera and Tejani (2014).
19. Studying the impact of appliances ownership on time use in Australia, Bittman et al. (2004) find that women in households that own domestic appliances do not seem to allocate fewer units of time to housework compared with women in households that do not own appliances. Therefore despite progress, disparities persist in the allocation of unpaid household work between women and men in industrialized economies.

20. "Recognize and value unpaid care and domestic work through the provision of public services, infrastructure and social protection policies and the promotion of shared responsibility within the household and the family as nationally appropriate" (target 5.4); and "Ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life" (target 5.5).

Chapter 2

The virtuous circle of manufacturing consumption

Interactions between consumer demand and industrial development

For a new manufactured good to be introduced to the market, demand is needed. A high initial price and few applications render a good accessible only to high-income households. As the sector consolidates and gains scale, prices fall, making the good affordable to more consumers. With enough demand in place, the good becomes mass consumed—"massified"—allowing for further exploitation of scale economies, the entry of new firms, greater competition and further declines in prices. This interactive process between demand and supply enables the diffusion of new, better and ever cheaper goods for consumers alongside the expansion and development of new industrial sectors and related providers.

This interactive process has been illustrated as a virtuous circle of manufacturing consumption in the previous chapter (see Figure 1.8). This chapter examines in detail the core mechanisms acting in this circle and the conditions for it work well.

On the demand side, increases in income alter consumption patterns, shifting household demand from food towards manufactured goods and services, and creating demand for new manufactured products in a country. Increased demand for new products to a sufficient level of scale gives an impetus to the start of their domestic production. How fast a new product diffuses in a country depends on country- and product-specific factors. As a country's income level is one of the key factors, countries with higher economic growth tend to experience faster diffusion. However, even countries at a similar income level might differ in their diffusion of the same product owing to differences in the distribution of income, because countries with high income inequality might have fewer households at an income needed to buy the product. Product-specific factors can also break the relationship between income and product diffusion. Normally, diffusion of a product increases as income rises, at least until a certain income threshold, but a product with high utility relative to price (such as a mobile phone) could diffuse very quickly, regardless of a country's income level.

On the supply side, as domestic firms manufacturing new products accumulate production experience, the initial high production costs usually go down gradually. Greater economies of scale from the expansion of the domestic market and of export opportunities, improvements in production-related infrastructure, and government policy incentives can all contribute to the take-off of the new industry and massification of new products. Increasing quality and cost competitiveness can further expand domestic production and make the products affordable for more households. This further stimulates higher production volume, productivity increases and price reductions, and such success will induce firms to increase product variety so as to meet the varying needs of customers and capture new markets.

This process of diversification, massification and price decline can create two key outcomes, leading once more to a shift in consumption patterns and the continuation of the circle. One is employment and increased income for those now employed in new (and related) industries. The benefits for a national economy from the new industries will also come from the consumption multiplier through spending the income generated by the new industries (and related activities). The other outcome is a surge in the consumer surplus owing to increased affordability of the new product stemming from the expansion and higher productivity of the new industries. The consumer surplus increases disposable income and leads households to start buying goods that they could not afford before.

Global conditions important for the circle to start and then keep turning include economic stability and growth, supportive trade and technology-transfer regimes (for developing countries), and future global demand for manufactured products—as well as, in the long term, environmental sustainability. Country conditions include the distribution of income, domestic

> **"Increases in income alter consumption patterns, shifting household demand from food towards manufactured goods**

production capabilities for meeting growing demand and raising productivity, and comparative advantages in certain industries.

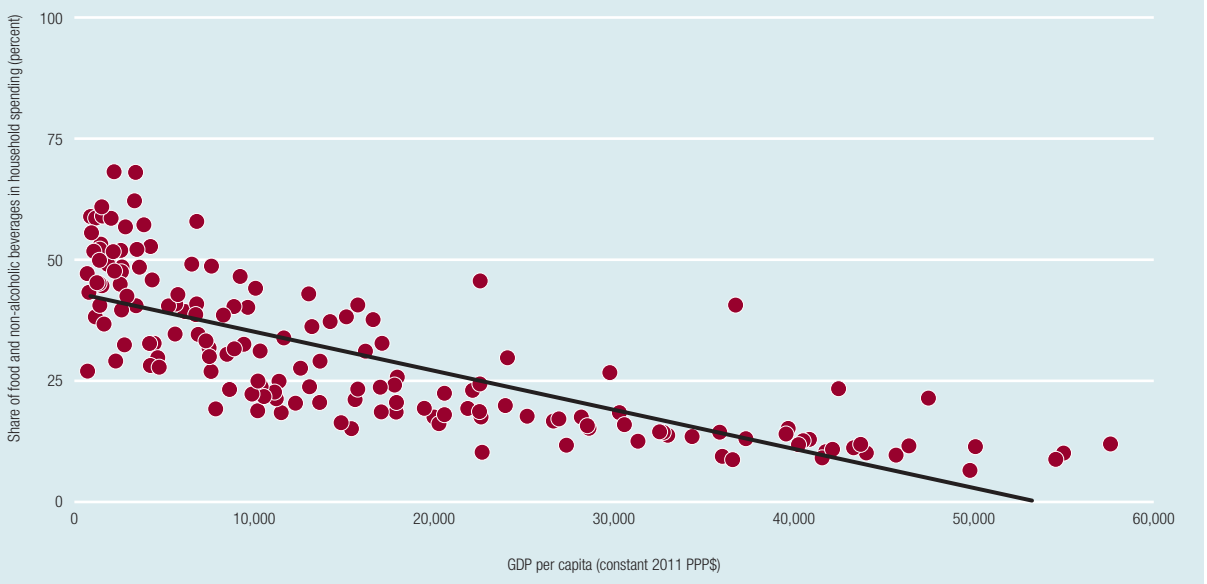
Diversification of demand and the emergence of new industrial sectors

Relationship between income and consumption patterns

Food accounts for 56–78 percent of the budgets of the world's poorest people (Banerjee and Duflo 2007).[1] As incomes rise, the share of household spending allocated to food declines—a pattern known as Engel's Law (Engel 1895). According to Banerjee and Duflo (2007), a 1 percent increase in overall expenditure is associated with about a 0.7 percent increase in the average share of spending on food by a poor family. Evidence for Engel's law is found in poor and rich countries alike (Figure 2.1). Between 1968 and 1981, the share of food in the average budget was about 18 percent in the United States and 64 percent in Sri Lanka (Clements and Chen 1996). In international $ in 1985 prices, average gross domestic product (GDP) per capita during this period was $13,012 in the United States and $1,469 in Sri Lanka.

The traditional approach to investigating how income influences household expenditure is through the study of Engel curves, which describe how household expenditure on a good or service varies with household income. This chapter also stresses the importance of identifying satiation levels. A key conjecture of many models of consumer behaviour and demand-driven structural change is that household expenditure on a good has an upper limit, called the satiation level; once it is reached, household expenditure ceases to rise in response to increasing income (Pasinetti 1981). Satiation potentially plays a crucial role in driving structural change from the demand side, as it may imply that increases in demand in a sector eventually slow, as more households reach the level of income at which satiation occurs. Resources would then shift away from industries supplying goods for which demand has satiated towards industries that produce goods for which demand has not yet been satiated.

Figure 2.1
The share of household spending on food declines as income rises



Note: All values are for 2011. Household expenditures are in current $. GDP is gross domestic product and PPP is purchasing power. Classification of food and non-alcoholic beverages is based on Annex C4, Table C4.1.
Source: UNIDO elaboration based on the 2011 International Comparison Program dataset (World Bank 2015) and World Development Indicators (World Bank 2017b).

“The examination of Engel curves provides interesting insights into the process by which demand diversifies away from some products towards others

The examination of Engel curves for different types of goods provides interesting insights into the process by which demand diversifies away from some products towards others. This, however, requires specific data on consumption expenditures by households at different levels of income around the world.

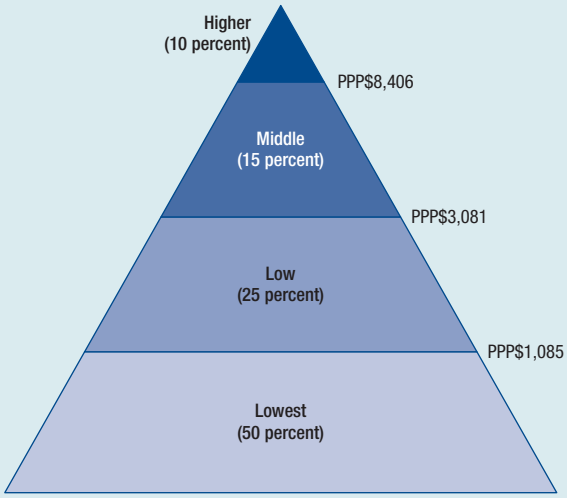
Data description

The data used for the analysis in this chapter are from the World Bank's Global Consumption Database, which is based on the World Bank's national household consumption or expenditure survey datasets. All the data presented are from 2010. They cover 91 countries, including emerging industrial economies and industrialized economies (22 percent), other developing economies (42 percent) and least developed countries (36 percent). The data cover 106 consumption categories, including 32 food-related products, 35 types of services and 44 types of non-food manufactured goods.

The Global Consumption Database examines four income segments for each country (lowest, low, middle and higher), proxied by total consumption expenditure (Figure 2.2). These segments are based on global income distribution data. The lowest income segment corresponds to the bottom half of the global distribution; the low income segment to the 51st–75th percentiles; the middle consumption segment to the 76th–90th percentiles; and the higher income segment to the 91st percentile and above.

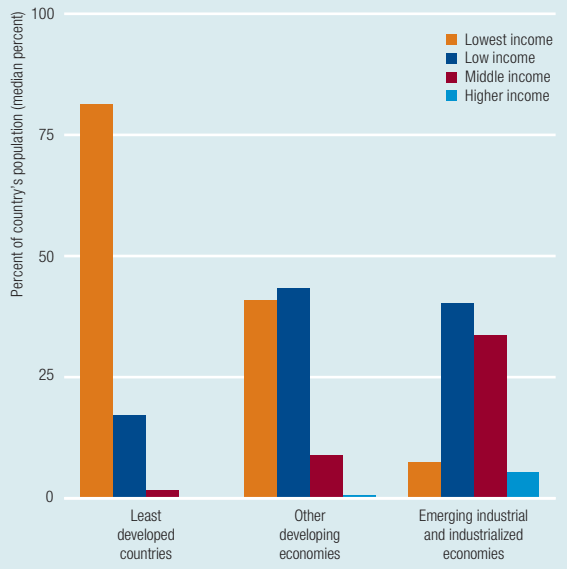
The income distribution of the population varies widely by country. A household that is rich at the country level could belong to the lowest global segment. Figure 2.3 shows the distribution of the population across global income segments in LDCs, other developing economies and emerging industrial and industrialized economies. In least developed countries 80 percent of the population belongs to the lowest global income segment, and less than 0.01 percent of the population falls into the higher income segment. In emerging industrial economies and industrialized economies,[2] 5 percent of the population belongs to the higher income segment.

Figure 2.2
Income segments in the Global Consumption Database



Source: UNIDO elaboration based on the Global Consumption Database (World Bank 2014).

Figure 2.3
Large differences in the distribution of the population across income segments and development stages



Note: All values are for 2010 and in constant 2010 PPP$ (PPP is purchasing power parity). Industrialization level and income classifications are based on Annex A1, Table A1.1.
Source: UNIDO elaboration based on dataset by Moneta and Stepanova (2017) derived from the Global Consumption Database (World Bank 2014).

"The response of different manufactured goods to changes in income depends on consumers' location and socioeconomic status; it also changes over time

Table A1.1 in Annex A1 classifies countries based on the top 5 percent of population: If the top 5 percent belongs to the lowest-income segment of the Global Consumption Database income categories (i.e., yearly income below PPP$1,085 [PPP is purchasing power parity]), the country belongs to the lowest-income group. If the top 5 percent belongs to the low-income segment, the country is included in the global low-income group, and so on. This classification allows average consumption elasticities to be estimated for each group.

Engel curves for food, manufacturing and services

Figure 2.4 plots Engel curves for manufacturing, services and food for countries in the global higher income group (last column in Table A1.1 in Annex A1). In this segment, most expenditure goes towards services, followed by manufactured goods and food. In the middle income segment, between the second and third dots in Figure 2.4, expenditure on food still represents a large share of households' budgets; in many countries, it accounts for a larger share of expenditure than manufactured products. Services appear to display the highest income elasticity (as suggested by the steep slope of the Engel curves), followed by manufacturing and food.

Income elasticities by type of good

The response of different manufactured goods to changes in income depends on consumers' location and socioeconomic status; it also changes over time, reflecting different stages of the life cycle of manufactures. Within a country, the same product can be a luxury for the lowest-income segment and a necessity for the highest-income segment. Over time, goods introduced at high prices and accessible only by high-income households can become necessities, as innovations reduce their prices and broaden their applications.

The patterns of consumption can be illustrated by the income elasticities of demand—the percentage increase in the consumption of a product in response to a 1 percentage point increase in income (Figure 2.5). From all consumption items covered in the Global Consumption Database, the analysis of this section focuses on 15 manufactured goods that can be mapped one-to-one to manufacturing sectors in the International Standard Industrial Classification (ISIC).[3] Within these goods, pharmaceutical products are at the bottom of the list (demand is highly inelastic), automobiles at the top (demand is highly elastic).

Products can be grouped using the following standard classification: inferior goods (elasticity less than 0), necessities (elasticity of 0–1) and superior goods (elasticity greater than 1). Pharmaceutical products, clothing and footwear are necessities in most countries. Cars, motorcycles and petrol (gasoline) are superior goods.

Comparing average elasticities in different income segments reveals how a product may be a luxury good for people in the lowest income segment and a necessity for people in the higher income segment (Figure 2.6). This pattern is clearest in the least developed countries and other developing economies; it is less obvious in the emerging industrial and industrialized economies, where both clothing and household textiles keep a similar level of elasticity across all income segments. This might be reflecting quality improvements and increases in the varieties of products catering to diverse preferences of customers that could raise the income elasticities of demand even for such products once considered necessities, like clothes and household textiles.

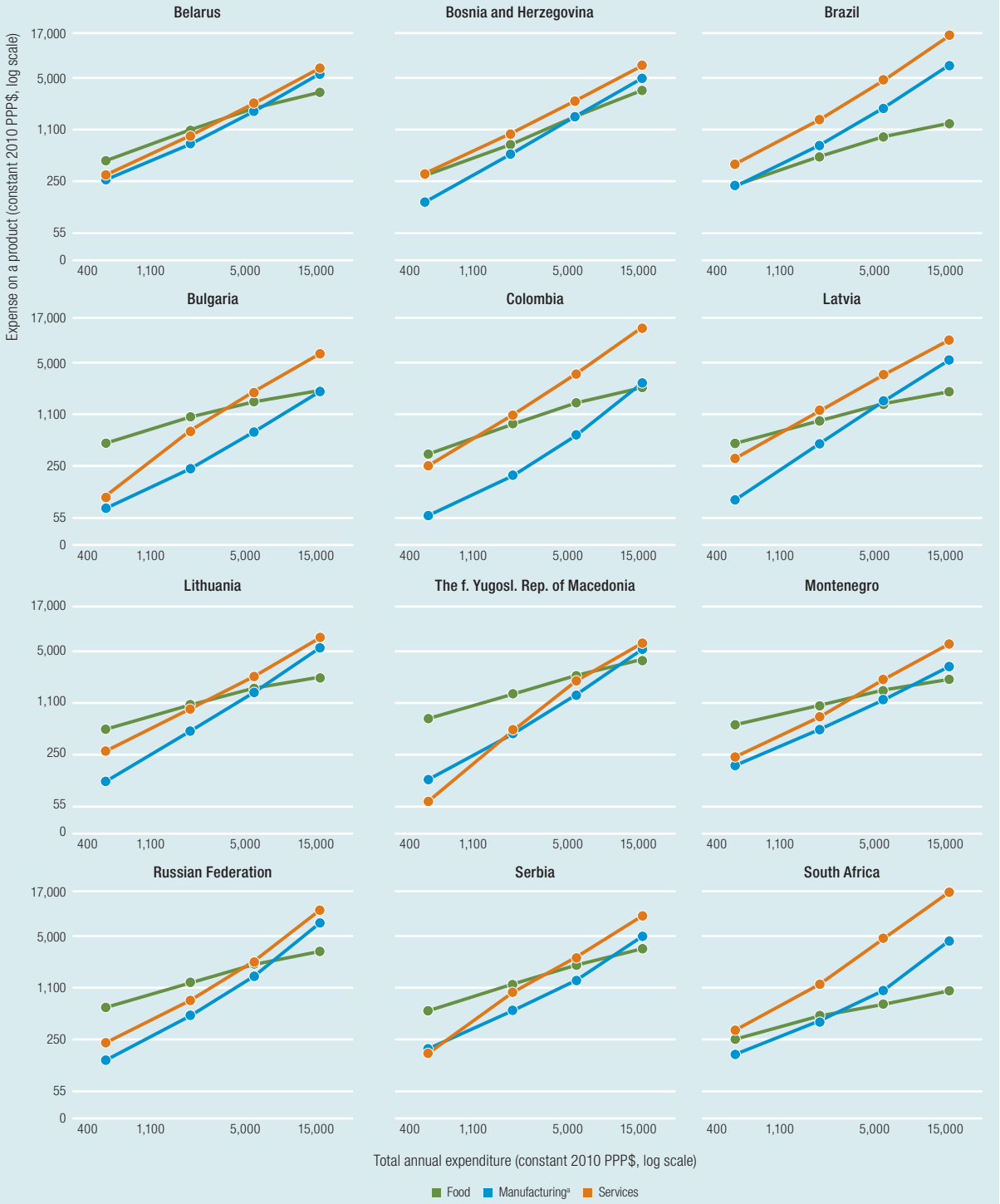
Declines in the median income elasticity when comparing lower-income segments with higher-income segments is also evident across many other manufacturing products, as seen in Annex A2, Figure A2.1. This indicates that demand for manufacturing products may slow once people have enough income to enjoy the basic functional utilities of manufacturing products.

Satiation

Demand for a product is affected by the tendency for consumers to become satiated. This tendency is a long-term driver in the virtuous circle shown in Figure 1.8

“Demand for a product is affected by the tendency for consumers to become satiated

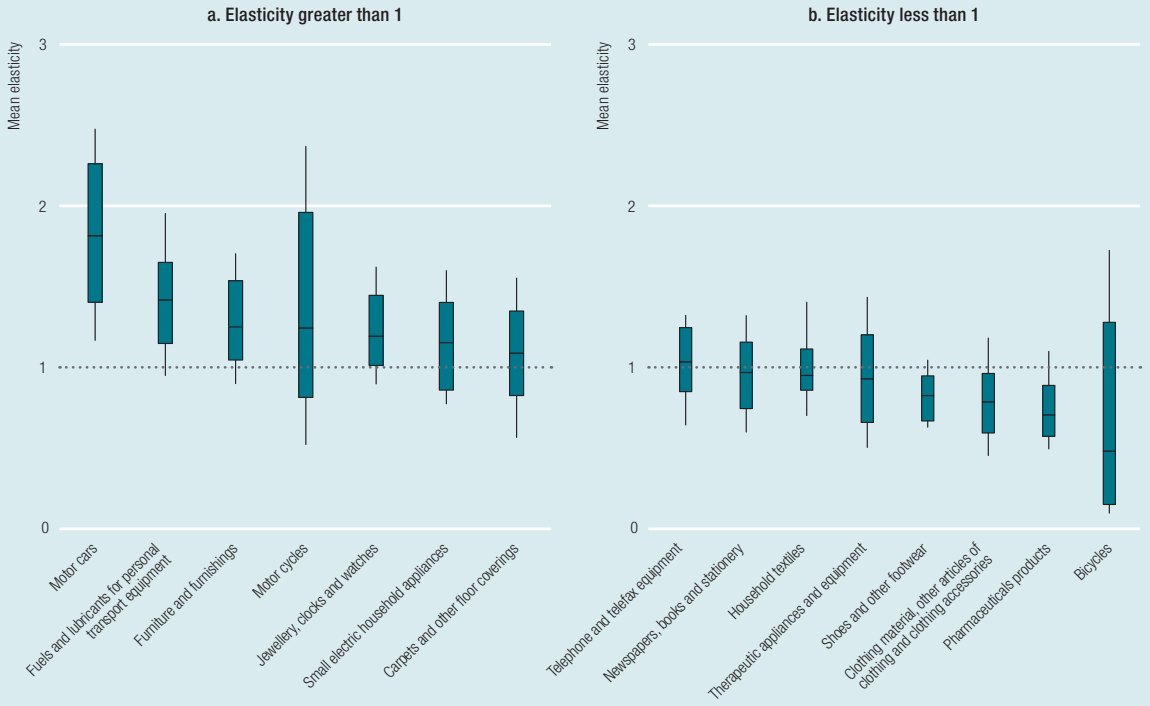
Figure 2.4
High income households in general spend less on food than other products



a. Excludes food and non-alcoholic beverages; alcoholic beverages, tobacco and narcotics and other personal effects.
Note: All values are for 2010 and in constant 2010 PPP$ (PPP is purchasing power parity). Aggregate Engel curves of manufacturing, services and food for countries belonging to global higher-income group (see Annex A1, Table A1.1). Manufacturing consumption goods classification is based on Annex C4, Table C4.1.
Source: UNIDO elaboration based on dataset by Moneta and Stepanova (2017) derived from the Global Consumption Database (World Bank 2014).

> **“Demand for food is easily satiated; demand for manufacturing products and services is not**

Figure 2.5
Consumer durables and luxury goods have high income elasticities of demand



Note: All values are for 2010 and in constant 2010 PPP$ (PPP is purchasing power parity). A product is classified as a necessity if the elasticity is between 0 and 1. Manufacturing consumption goods classification is based on Annex C4, Table C4.1.
Source: UNIDO elaboration based on dataset by Moneta and Stepanova (2017) derived from the Global Consumption Database (World Bank 2014).

in Chapter 1 and in the transformation of a country's economic structure. Box 2.1 explains how the satiation rate is calculated.

Demand for food is easily satiated; demand for manufacturing products and services is not (Figure 2.7). This tendency is generally true for households in the middle and higher global income groups. For households at low income levels, consumption of manufactured goods and services increases at a slower rate than income (see Annex A2, Figure A2.2). Until income reaches about $2,000 a year, consumption of manufactured goods is limited.

Box 2.1
Calculating the satiation rate

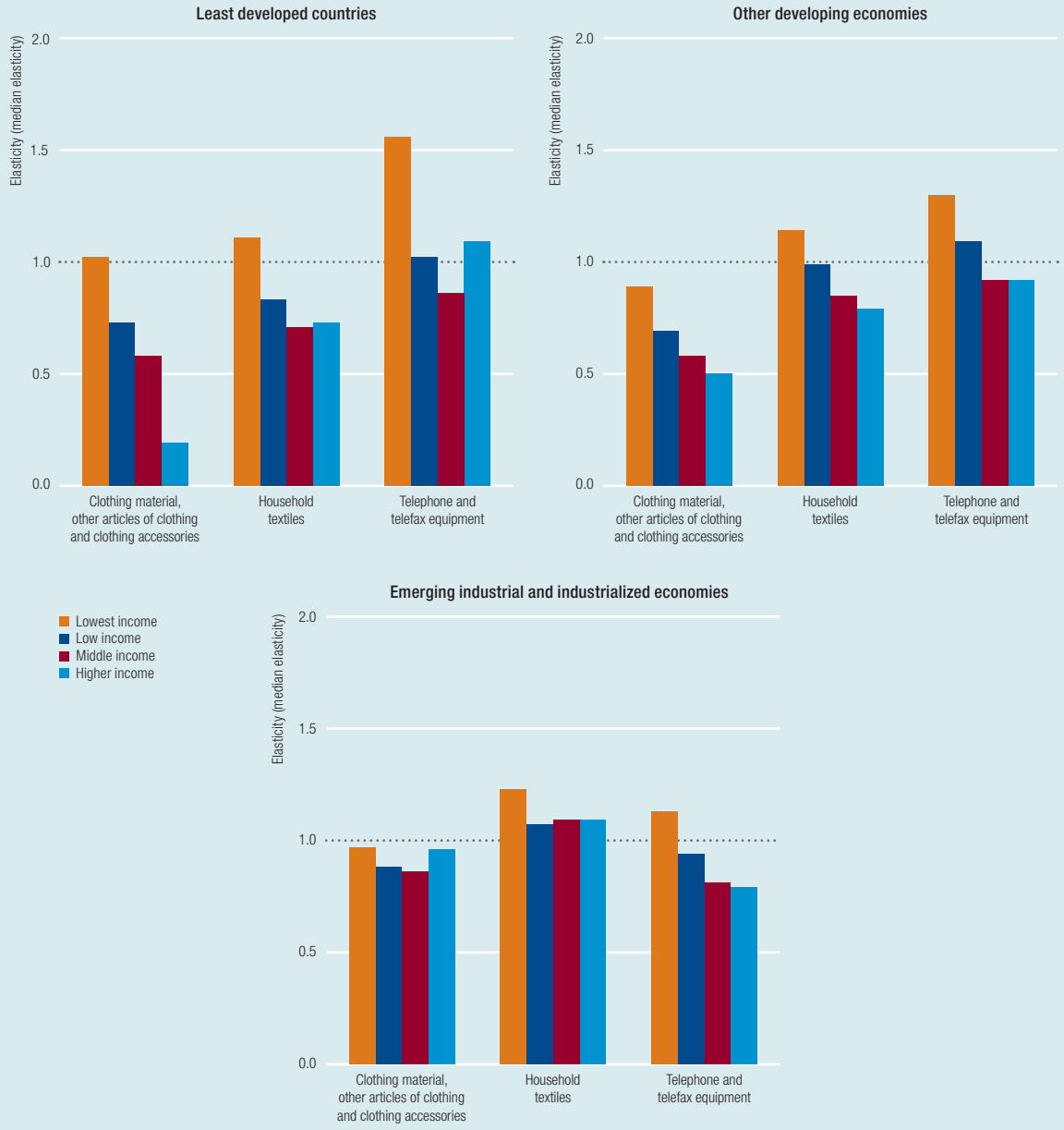
The satiation rate is calculated as a ratio of the slopes of Engel curves at two income levels (see Figure 2.4). For the higher-income group, the ratio is based on the slopes of the high- and middle-income segments (between the fourth and third dots from the left on the Engel curve in Figure 2.4). For the middle-income group, the ratio is based on the slopes of the middle- and low-income segments (between the third and second dots from the left). For the low-income group, the ratio is based on the slopes of the low and lowest segments (between the second and first dots from the left). A satiation rate of less than one suggests that demand for a product is satiated.

Creating variety

An increase in income as a result of the growth of existing industries and the consumption multiplier effects will not, per se, lead households to proportionally expand their consumption of goods and services. The effect depends on the *level* of household income, and the income elasticity of demand. Average income elasticity of demand for motor vehicles can be high, for example, but it is likely to be close to zero for the

“Under the right conditions, changes in consumption patterns create new demands and provide incentives to start new manufacturing activities

Figure 2.6
Lowest income households spend more on household textiles and telephone equipment as income rises



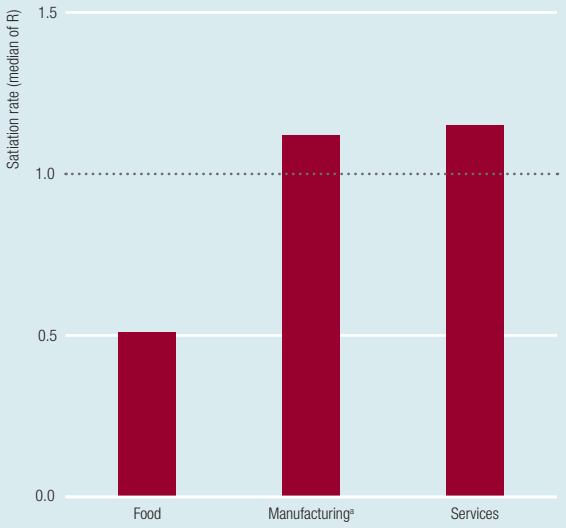
Note: The figure considers the consumption of selected manufacturing goods across income groups within each of the three development groups: emerging industrial and industrialized economies, other developing economies and least developed countries. The threshold is the same as in Figure 2.2. All values are for 2010 and in constant 2010 PPP$ (PPP is purchasing power parity). A product is classified as a necessity if the elasticity is between 0 and 1. Industrialization level and manufacturing consumption goods classifications are based on, respectively, Annex C1, Table C1.2 and Annex C4, Table C4.1.
Source: UNIDO elaboration based on dataset by Moneta and Stepanova (2017) derived from the Global Consumption Database (World Bank 2014).

majority of people in low-income countries, because incomes are well below the minimum threshold for purchasing a motor vehicle.

Under the right conditions, changes in consumption patterns create new demands and provide incentives to start new manufacturing activities through investment and innovation. The emergence of new industries and markets has two important effects on consumers. First, new industries generate additional income and employment opportunities, which

> **"The variety of goods consumed tend to increase with economic development**

Figure 2.7
Food products satiate but manufacturing products and services do not



a. Excludes food and non-alcoholic beverages; alcoholic beverages, tobacco and narcotics and other personal effects.
Note: All values are for 2010. R is the satiation rate. There is a tendency of satiation below the dotted line at R = 1. Manufacturing consumption goods classification is based on Annex C4, Table C4.1.
Source: UNIDO elaboration based on dataset by Moneta and Stepanova (2017) derived from the Global Consumption Database (World Bank 2014).

may trigger changes in the composition of household spending. Second, new industries can improve living standards, by making new varieties available and realizing economies of scale that enable the prices for those new varieties to fall and be consumed by a larger share of the population.

As wealth grows, households tend to alter their spending patterns. This phenomenon is viewed as a welfare-enhancing feature of modern economic development (Barro and Sala-i-Martin 1995, Grossman and Helpman 1991, Romer 1990). The most direct assessments of these benefits are found in the estimated gains in consumer surplus from increased variety (see Chapter 1).

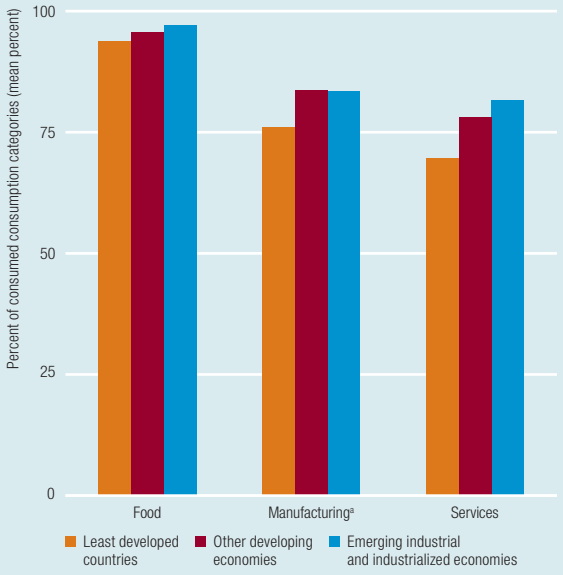
Empirical evidence confirms this trend: Average consumption bundles are larger in countries with higher GDP, indicating that the variety of goods consumed tend to increase with economic development. Figure 2.8 shows the percentage of the 106 products in the Global Consumption Database consumed by each country grouping. The least developed world on average consumes 94 percent of available food categories, 76 percent of available manufacturing categories compared to the 97 percent of food categories and 83 percent of manufacturing categories consumed by the emerging and industrialized countries.

For the creation and diffusion of new varieties of goods, it is important to look not only at new goods but also at improvements in existing goods. The literature characterizes new or increased variety along two broad dimensions: unrelated and related.[4]

"Unrelated" refers to goods of an intrinsically different nature.[5] A washing machine and a refrigerator, for example, are unrelated. As they satisfy different needs, they can diffuse simultaneously as income increases.

"Related" refers to versions of the same product that are differentiated by quality, design or other product characteristics. Products and services in a sector

Figure 2.8
Consumption bundles expand as countries develop



a. Excludes food and non-alcoholic beverages; alcoholic beverages, tobacco and narcotics and other personal effects
Note: All values are for 2010 and in constant 2010 PPP$ (PPP is purchasing power parity). Industrialization level and manufacturing consumption goods classifications are based on, respectively, Annex C1, Table C1.2 and Annex C4, Table C4.1.
Source: UNIDO elaboration based on dataset by Moneta and Stepanova (2017) derived from the Global Consumption Database (World Bank 2014).

> **When luxuries turn into necessities that the vast majority of households can afford, they are said to 'massify'**

are more closely related to each other than to products and services in other sectors (Saviotti and Frenken 2008). An increase in unrelated variety occurs intersectorally; an increase in related variety occurs intrasectorally. An upgrade in the quality of a good that does not replace the previous version of the good can also be regarded as an increase in the related variety of the economy.

In some cases, a higher-quality or differentiated version of an old good completely replaces the old one (as in the case of colour televisions in high-income countries). In other cases, the differentiated versions of the good coexist, targeting different segments of the market. Demand for compact cars may become satiated at relatively low levels of GDP per capita, whereas the satiation point for luxury cars takes place at only extremely high incomes (The Economist Intelligence Unit 2016). As income rises, moving towards the production of higher-quality segments may be the only way to sustain high growth in the demand for specific goods.

Massification of demand and the consolidation of industrial sectors

When luxuries turn into necessities that the vast majority of households can afford, they are said to "massify." A salient feature of successful manufactures is their broad-based diffusion across households. The diffusion of most goods follows an S-shaped pattern (see Rogers 2003). At first, only a few individuals adopt the new good; soon more and more individuals adopt it. Later the rate of adoption begins to level off, as fewer and fewer individuals remain who have not yet adopted. Eventually, the S-shaped curve reaches its asymptote. The good has become a mass product.

This pattern is evident for a range of goods across different development groups (Figure 2.9). Adoption of new consumer goods appears to have accelerated around 2005.

Although the diffusion of many manufactured products follows an *S*-shaped pattern, the speed and maximum potential level of diffusion differs across products, as shown in Figure 2.10, a cross-sectional estimate based on 2016 data on 86 countries. Household ownership of refrigerators and vacuum cleaners, for example, reaches almost 100 percent once national income rises to $20,000–$25,000 per capita (in 2005 PPP$). Car ownership never reaches 100 percent, because cars are much more expensive than household appliances and may not be necessary in places with good public transit.

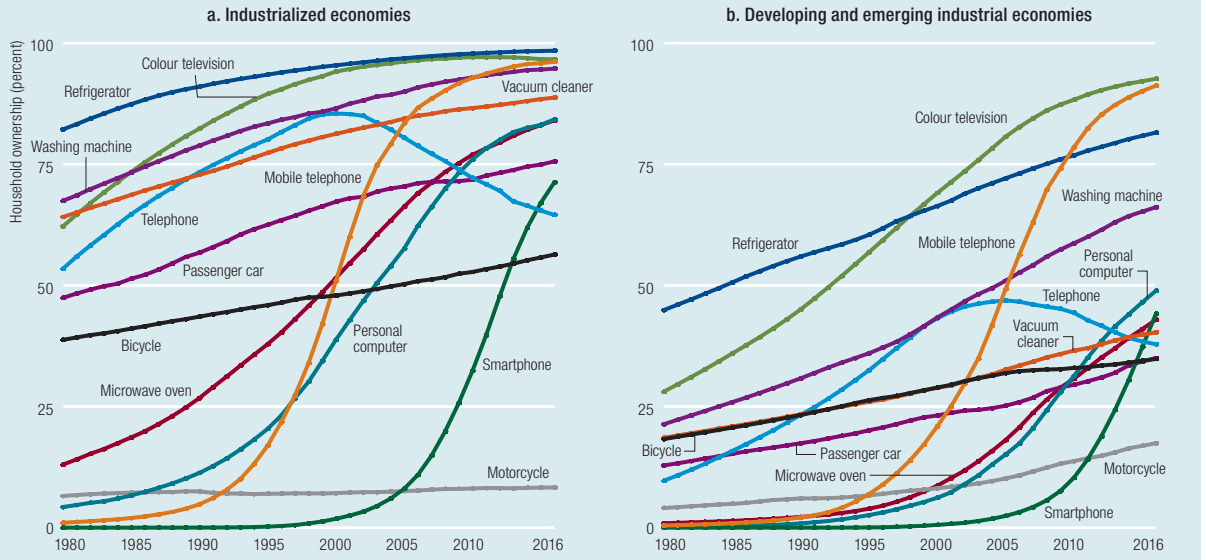
Both country-specific factors (including the growth rate of the economy, the distribution of income, and geographical and demographic conditions) and product-specific characteristics affect the speed of diffusion. China and Viet Nam (high-growth countries), for example, have steeper slopes (faster diffusion) for many manufactured products than Cameroon and Kenya. Across the six countries in Figure 2.11, mobile phones and colour television sets diffuse faster than vacuum cleaners and cars.

Changes in demand patterns as countries develop and the massification of consumption are closely linked to the emergence and consolidation of domestic manufacturing industries. Low-income countries, for instance, normally develop the food and beverage, wearing apparel and textile industries, all of which produce necessities (Figure 2.12). These industries are also labour intensive and may create formal sector jobs. Increasing demand in these industries can have a profound impact on the incomes of workers employed in labour-intensive manufacturing industries and became an important avenue to initiate the virtuous circle of manufacturing consumption.

In the medium to long term, the income elasticity of demand for necessities declines. However, the level of consumption continues to increase, albeit at a slower pace. Within a broad category of necessities like food, products like organic foods are likely to maintain or even increase their income elasticity. Increases in variety and convenience (e.g. frozen food) can help sustain the growth of the food and beverage sector, as indicated by the continuous increase in Figure 2.12.

> **Higher labour productivity in manufacturing reflects capital investment, economies of scale and skill improvements**

Figure 2.9
Over the past decades, household consumption of durable manufacturing goods has spread at an increasing rate around the world



Note: Industrialization level classification is based on Annex C1, Table C1.2.
Source: UNIDO elaboration based on Euromonitor International (Economies and Consumers; Possession of Household Durables, 2016).

Increasing production efficiency and raising purchasing power

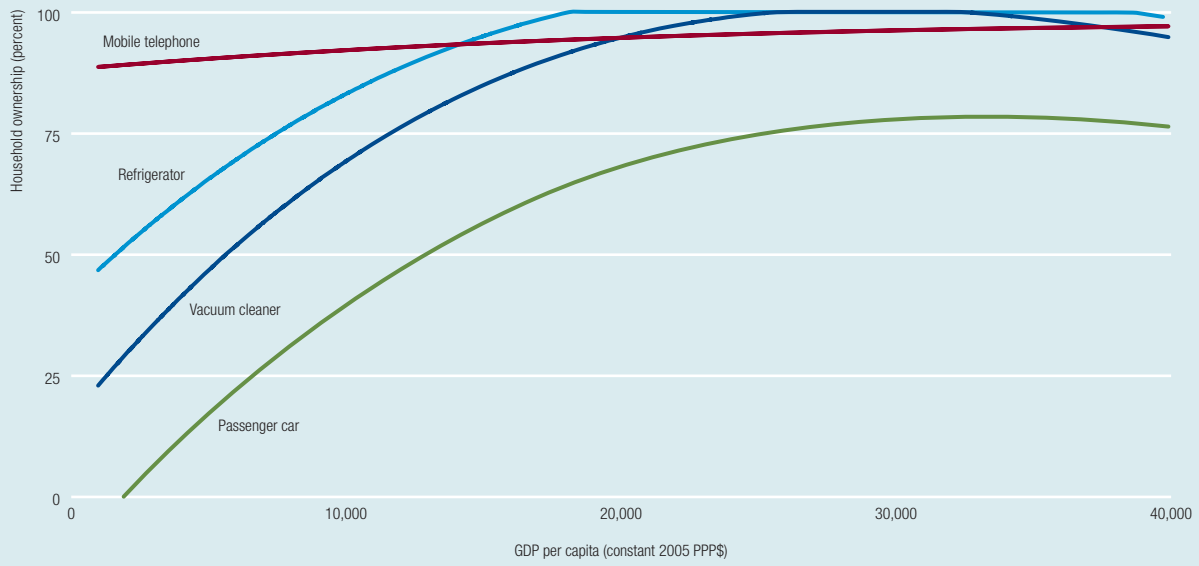
Reducing the prices of manufactured goods

As shown in Chapter 1, prices of manufacturing goods display a systematic downward trend relative to prices in all other sectors of the economy. This is closely related to an important characteristic of the industrial sector—its higher potential for productivity gains when compared with the rest of the economy. The long-run patterns of structural change are consistent with productivity growth and falling prices in agriculture and manufacturing as countries develop. Appelbaum and Schettkat (1995) depict the postwar "Golden Age" for industrialized countries as a period when rapid productivity growth driven by economies of scale in manufacturing resulted in falling prices. These declines expanded markets for mass-produced goods, because the price and income elasticities of demand were high. Manufacturers could pass on productivity increases as reduced prices to consumers, stimulating further demand and allowing them to expand production and employ more workers.

Figure 2.13 shows the average annual percentage change in labour productivity and the price index between 1970 and 2012 for countries in different development groups. It shows that agriculture and manufacturing had much higher labour productivity than services for all country groups except least developed countries over the period. Given the normal patterns of structural change, in which the share of agricultural employment declines (and does so more rapidly than the sector's value added) as countries develop, high labour productivity in agriculture is probably associated with the move of surplus labour out of agriculture without reducing output much. Higher productivity in manufacturing reflects capital investment, economies of scale and skill improvements. Highly productive sectors kept their price increases lower than lower-productivity sectors. As a result, output from non-manufacturing industries and services have become more expensive than agricultural and manufactured products (see Figure 2.13, panel b).

“The decline in manufacturing prices is translated to consumers generating gains in their ‘real’ incomes

Figure 2.10
The speed and diffusion potential of many durable goods depend on income levels and product characteristics



Note: All values are for the period 1980–2016.
Source: UNIDO elaboration based on World Development Indicators (World Bank 2017b) and Euromonitor International (Economies and Consumers; Possession of Household Durables, 2016).

Figures 2.14 and 2.15 look at the productivity and price changes of different types of manufacturing products, grouping 23 manufacturing industries into four categories: electronics and information and communications technology (ICT) equipment (high-tech investment goods), other investment goods, intermediate goods and final consumption goods (Annex C5, Table C5.1 lists industries in each category). Among the four categories, high-tech investment goods and other investment goods tend to have higher labour productivity (except in least developed countries, for which data are patchy). Figure 2.15 reveals an association between higher productivity and lower price increases.

Electrical machinery and apparatus is a representative industry within the high-tech category. Figure 2.15 (panel a) illustrates the reaction of value added per capita, employment and labour productivity in the industry when GDP per capita increases by one percentage point (vertical axis) as income level increases (horizontal axis). The industry experiences rapid and sustained labour productivity growth even after a country reaches upper-middle-income level, which more than compensates for the decline in employment. As a result, value added per capita in the industry continues to grow more rapidly than GDP per capita even at very high levels of incomes.

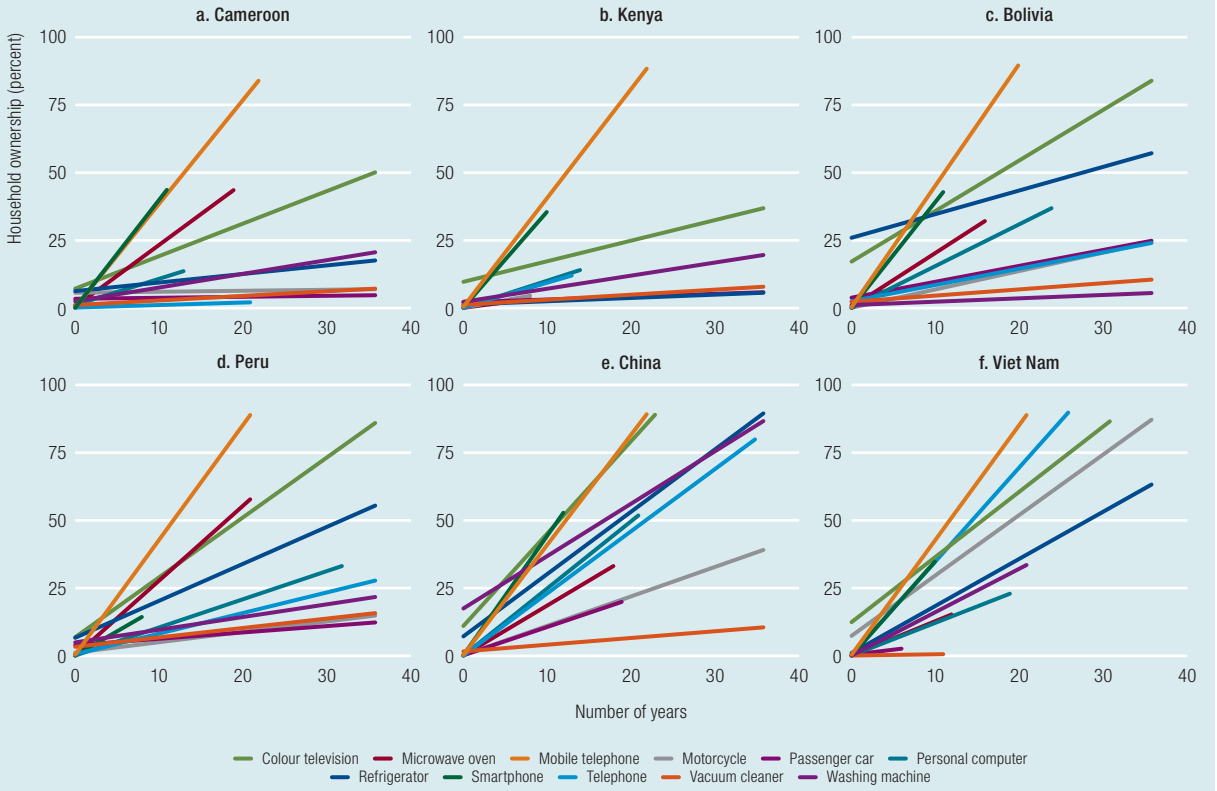
In contrast, in the food and beverage industry, as in most industries in the final consumption group, labour productivity grows much more slowly, because of faster deceleration in the growth of value added per capita (Figure 2.15, panel b). High-tech industries seem to avoid the slowdown or satiation of demand for their output by creating new demand, through innovation. New products in this sector tend to have a high price elasticity of demand, which leads producers to reduce prices, as a price reduction is more than compensated by an increase in the quantity demanded.

Increasing real incomes

A key feature of the virtuous circle presented in Figure 1.8 (Chapter 1) is that the decline in manufacturing prices is translated to consumers generating gains in their “real” incomes. When the goods where prices are

> **“For the virtuous circle to raise living standards in developing economies, international conditions must be favourable**

Figure 2.11
Speed of diffusion varies due to country-specific conditions



Note: Only products with less than 40 percent household ownership in 1980 are included. Counting begins from 1980 or the year when ownership exceeds 1 percent.
Source: UNIDO elaboration based on Euromonitor International (Economies and Consumers; Possession of Household Durables, 2016).

declining most rapidly represent an important share of the consumption basket the overall purchasing power of consumers will be significantly augmented, even if their nominal incomes remain the same.

For real consumption wages (the nominal wage divided by the price of consumption goods) to increase, the prices of consumer goods need to increase more slowly than income. They are likely to do so if the industry has access to less expensive investment and intermediate goods, resulting from its productivity increase or the entry of efficient domestic and foreign producers (see Lewis and Peng 2017).

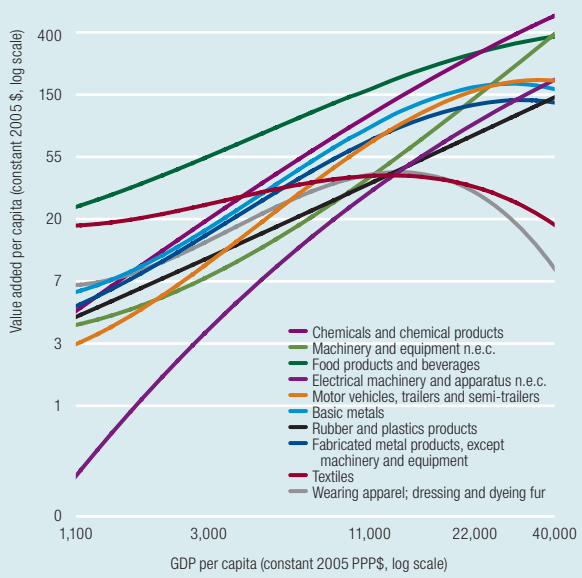
Successful diversification and increased demand for new products can further drive the virtuous circle. Massification of an initially exclusive product can make the product affordable or increase real wages. Low-income consumers, who are more price sensitive than others, tend to gain greater more from this price effect than from increases in variety and quality. These issues are further elaborated in Chapter 3.

Challenges and opportunities from the virtuous cycle

For the virtuous circle to raise living standards in developing economies, international conditions must be favourable. The most fundamental condition for a country to start the circle is to get on the course of a steady income increase. If a large share of the population is in poverty and facing no productivity increases, a country can stay mired in stagnation, unable to increase its income or consumption. This situation is typical when a country is at war or in political or macroeconomic turmoil. Under such circumstances, the rate of physical and human capital divestment or

> **"If a large share of the population is in poverty, a country can stay mired in stagnation, unable to increase its income or consumption**

Figure 2.12
Demand for necessities gives new impetus to labour-intensive industries in low-income countries

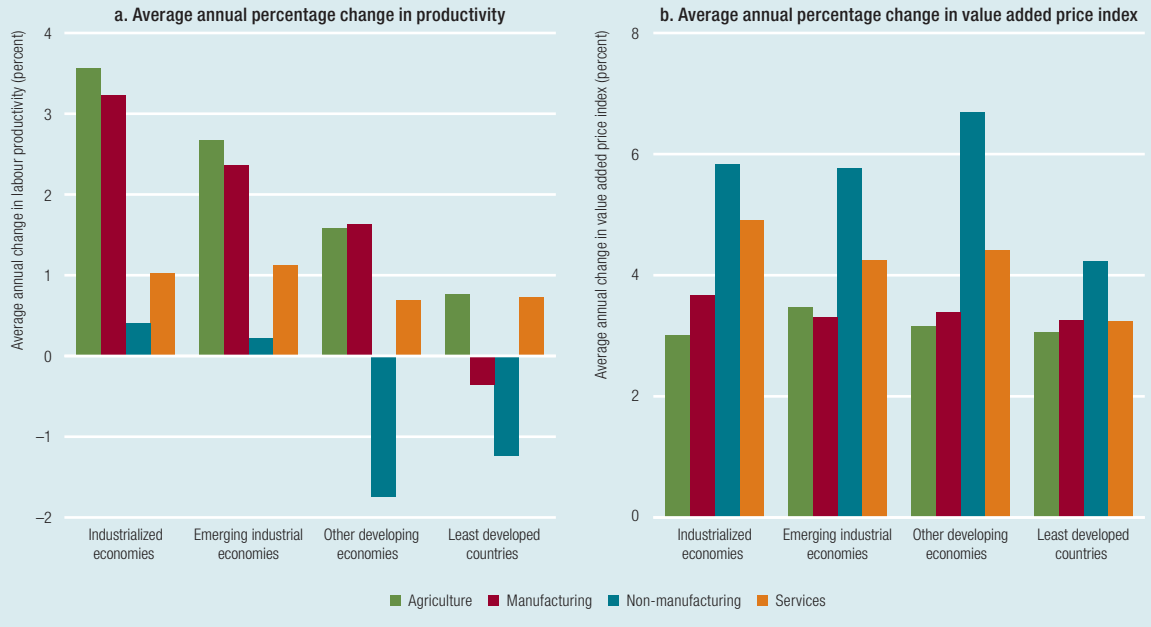


Note: All values are for the period 1963–2013. GDP is gross domestic product, PPP is purchasing power parity and n.e.c. is not elsewhere classified. Estimation sample comprised of large countries. Country classification is based on Haraguchi (2015), who defines large countries as having 12.5 million inhabitants or more. Industry group classification is based on Annex C2, Table C2.1.
Source: UNIDO elaboration based on the INDSTAT2 ISIC, Rev. 3. database (UNIDO 2017d), Penn World Tables 7.1 (Heston et al. 2012) and World Development Indicators (World Bank 2017b).

depreciation can be higher than that of investment, leading to falling productivity and income. In such countries, the priority should be to restore stability and improve the overall economic and political framework. Efforts by the international community are important in restoring peace and economic stability.

Once a country is on the path of a steady income increase, it can see an increase in demand for manufactured goods, thanks to the higher income elasticity of demand. However, to move from changes in demand patterns to new manufactured goods, a country needs access to technology. The existing regime of technology transfer between countries, particularly from advanced to developing countries, dictates how much and how rapidly countries can acquire new technologies. Barriers to international technology transfer and trade often limit the expansion of existing industries, preventing them from realizing economies of scale and hence increasing productivity and reducing relative prices. Such barriers may prevent another driving force of the virtuous circle—the real income effect—from materializing.

Figure 2.13
Manufacturing sector increases labour productivity faster and prices slowly



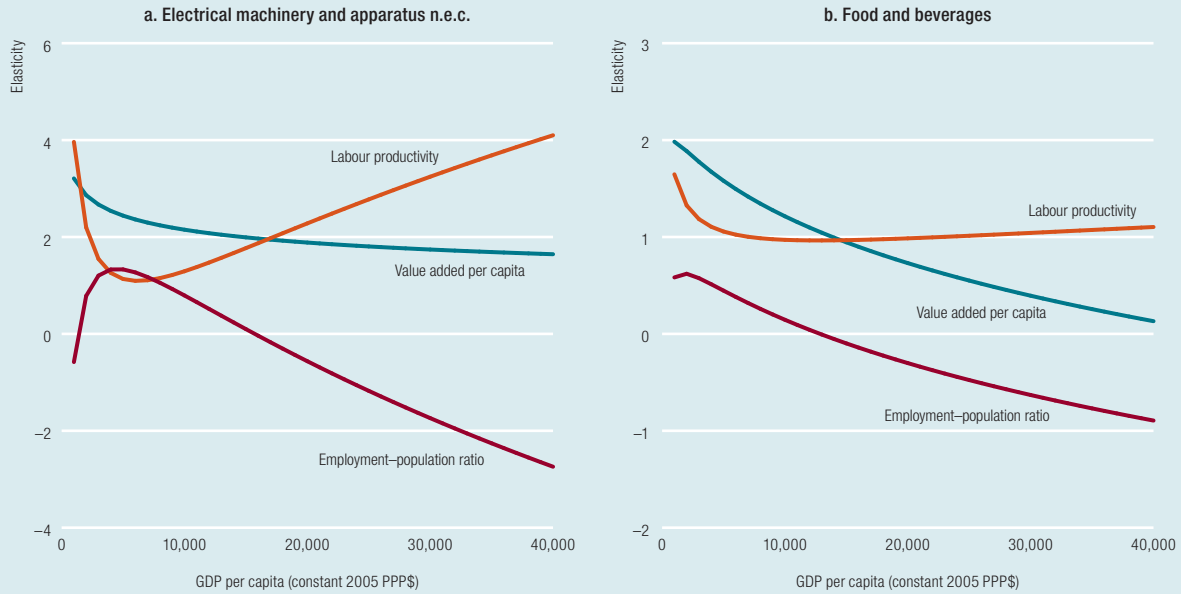
Note: All values for the period 1970–2012 and are in constant 2005 $. Industrialization level classification is based on Annex C1, Table C1.2.
Source: UNIDO elaboration based on Lewis and Peng (2017), the INDSTAT2 ISIC, Rev. 3. database (UNIDO 2016). Value added data is adapted from the National Accounts Main Aggregates Database, by United Nations Statistics Division, ©2015 United Nations. Reprinted with the permission of the United Nations.

> **“To move from changes in demand patterns to new manufactured goods, a country needs access to technology**

Figure 2.14
The higher the labour productivity is, the lower the price increase in the manufacturing sector

Note: All values are for the period 1970–2012 and in constant 2005 $. Industrialization level classification is based on Annex C1, Table C1.2.
Source: UNIDO elaboration based on Lewis and Peng (2017) and the INDSTAT2 ISIC, Rev. 3. database (UNIDO 2016).

Figure 2.15
Patterns of value added, employment and labour productivity change in electrical and machinery and food and beverage industries



Note: All values are for the period 1991–2013 and in constant 2005 $. GDP is gross domestic product, PPP is purchasing power parity and n.e.c. is not elsewhere classified.
Source: Haraguchi and Rezonja (2013).

"Access to new technologies can help producers—including those currently marginalized in international networks—tap hitherto inaccessible markets

In the interplay between demand and supply, innovation and new technologies are not limited to creating new products and improving existing ones. Innovation is also required to reduce transaction costs, enabling producers to reach their target markets. Improved air-freight, shipping containers and modularity are a few of the innovations that accelerated the flow of goods to markets in the past, helping their diffusion. Today, ICTs allow firms to serve new sources of demand by establishing an instantaneous connection with consumers. Access to new technologies can help producers —including producers in countries that are currently marginalized in international production networks—tap hitherto inaccessible markets (Box 2.2).

Domestic demand provides a crucial initial impetus for many manufacturing industries, including export-oriented ones, at least in their embryonic stages (see Chapter 3). Rapid and sustained growth of manufacturing industries, however, usually requires penetration of foreign markets, where producers can find faster growth of demand for their products after domestic demand slows. Figure 2.16 shows that household ownership of many products is still less than 50 percent in large emerging economies like China, India and Nigeria, suggesting huge potential for manufacturers to serve the increasing demand of these countries in the years to come.

Keeping the virtuous circle turning

Numerous pitfalls can prevent the circle from functioning. First, the income increase at the macro level may not reflect conditions across households at the micro level, because of income inequality. Especially in developing countries, an upper class is likely to

Box 2.2

Technology and changing patterns of demand: Implications of the spread of e-commerce platforms for developing and emerging countries

Historically, changes in technology have had an important influence on patterns of demand and therefore on the evolution of the manufacturing sector. All industrial revolutions were enabled by clusters of technologies that radically changed not only the way goods are produced, but also how they are distributed and consumed. Technology dramatically reduces the costs of transport and coordination, enabling producers, in principle, to reach ever-expanding markets. During the first industrial revolution, for instance, steam-powered mechanical production enabled the physical separation of consumption from production, leading to the emergence of a national and, later, a global market for manufactured products.

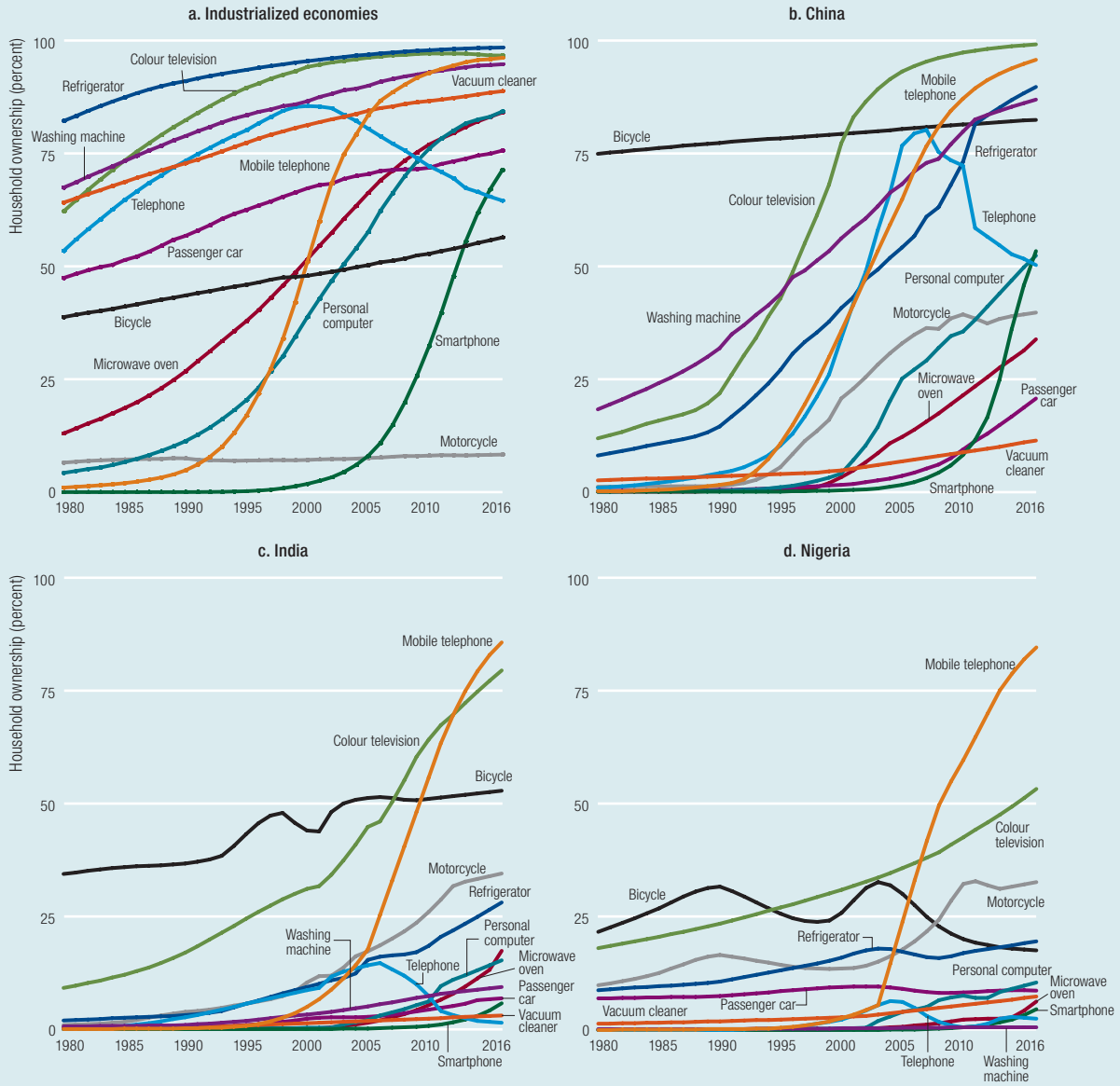
Each wave of technological change has reinforced this trend, leading to the consolidation of a global, if highly segmented, source of consumer demand. The emergence of a global market has led to unparalleled gains in prosperity across the world. Yet evidence is mounting that gains have not been evenly distributed. While global between-country inequality appears to be on the decline since the turn of the century, as a result of high growth in emerging industrial economies, within-country inequality remains high in both developing and industrialized countries (Milanovic 2016). Moreover, industrial activity is increasingly concentrated in a narrow set of manufacturing hubs around the globe (Chapter 7).

High fixed costs associated with entry into world markets, and agglomeration economies, are some of the factors that explain why only few firms and countries have benefited from an expanding global demand. The growth of online markets, enabled by the rollout of ICTs, has the potential to reverse the trend towards concentration, thus enabling a more even distribution of the gains from globalization. E-commerce platforms that lower the fixed costs associated with reaching destination markets, making it easier to match demand with supply, are a case in point. With the aid of the internet, the cost of activities such as, for example, searching for clients, establishing a distribution channel, or establishing brand reputation, are significantly reduced.

By lowering the cost of matching buyers with sellers, e-commerce platforms enable smaller firms, and particularly those in low- and middle-income economies, to access markets all over the world. A recent study finds that the effect of distance on international trade flows—across 61 countries and for 40 product categories—is 65 percent smaller when using an e-commerce platform relative to "offline" cross-border transactions (Lendle et al. 2016). Therefore, the technologies underpinning online markets, by offering smaller firms in developing economies the opportunity to benefit from the global market at a lower capital requirement than previously possible, have the potential of making globalization more inclusive.

> **“The persistence of high income inequality could dampen consumption of manufactured products and diminish the potential benefits of the virtuous circle**

Figure 2.16
Diffusion patterns of durable goods vary across countries at different stages of industrialization



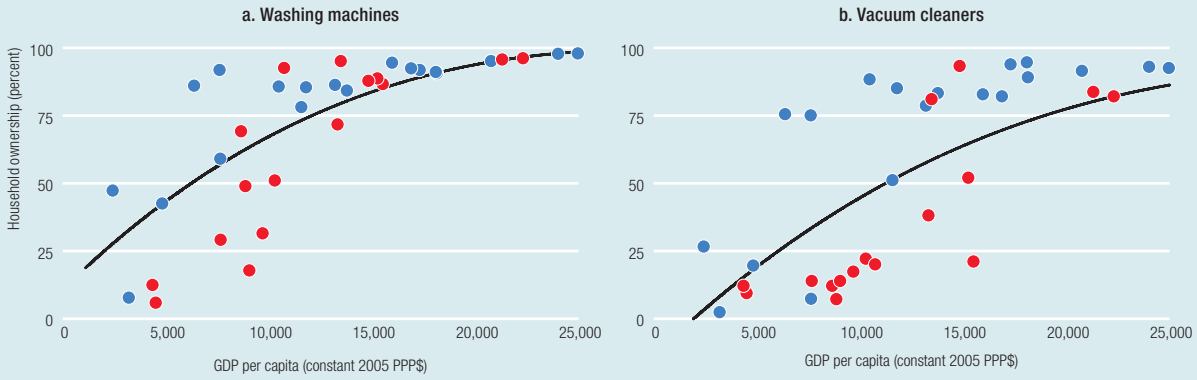
Note: Industrialization level classification is based on Annex C1, Table C1.2.
Source: UNIDO elaboration based on Euromonitor International (Economies and Consumers; Possession of Household Durables, 2016).

have a very different consumption pattern from the rest of the population. These households may spend most of their income on imported goods. In this case, increased purchasing power may not lead to the launch or expansion of new manufacturing industries.

Even if a country does not have such an extreme wealth concentration, the persistence of relatively high income inequality could dampen consumption of manufactured products and diminish the potential benefits of the virtuous circle. The examples of washing machines and vacuum cleaners are illustrative in this regard. When countries are compared with the estimated level of ownership that would be expected at their income level, those countries that are more unequal (as shown by the Gini coefficient) show lower diffusion rates (Figure 2.17). In the figure,

“Price reduction through massification is beneficial for consumers, but under certain conditions it can pose a challenge for producers

Figure 2.17
Income inequality lowers the diffusion of household durable goods



Note: All values are for 2011. GDP is gross domestic product and PPP is purchasing power parity. Countries marked with red have an inequality index (Gini coefficient) above the average.
Source: UNIDO elaboration based on World Development Indicators (World Bank 2017b) and Euromonitor International (Economies and Consumers; Possession of Household Durables, 2016).

the curve presents the estimated levels of household ownership of washing machines and vacuum cleaners, respectively, at different income levels. Countries with higher than average Gini coefficient (which are highlighted in red) tend to cluster below the curve, indicating low diffusion rates. A country with a high income inequality might fail to generate a large middle class that might well demand a large amount of similar goods. The lack of a large middle class may mean that domestic demand is insufficient to start the virtuous circle. Chapter 3 will analyse this issue in further detail.

To release labour and keep wages competitive, agricultural productivity often has to improve first (Kalecki 1955). As demand for goods from sectors that are more intensive in capital and technology increases, investments in skills, technology and research and development (R&D) play a greater role in upgrading and sustaining manufacturing development. Unless improvements in such factors take place, demand for new and more sophisticated goods will be filled largely by imports.

To keep manufacturing prices down and increase real income, manufacturing productivity has to increase, and the increase has to be passed down in the form of lower prices, not increased rents. Competition in the industry therefore has to be fairly high and exit and entry barriers low. Exposing nascent industries to full foreign competition, however, may not lead to productivity increases and price reductions. Instead, it can weaken, even destroy, the industry. For countries in the early stage of industrialization, it is therefore important to have time-bound trade and industrial policies to provide domestic industries with space to grow.

Several theories of the firm relate the capacity to generate rent to a degree of power over consumers, suppliers or both. These theories typically postulate that rents depend on barriers to entry. Kaplinsky (2006), for example, claims that anything that allows a firm to construct barriers to entry and limit competition “de-commodifies” its output and allows it to generate rent. Power over rents could mean that productivity increases are not passed on as price reductions.

In the context of global value chains, some firms have been able to exert power over rents further down the value chain in activities outsourced to suppliers in developing countries. Intense competition between suppliers and limited competition between lead firms have sometimes resulted in productivity increases being translated into price decreases for suppliers and lower input prices for lead firms in industrialized economies (Milberg and Winkler 2013).

Price reduction through massification is beneficial for consumers, but under certain conditions it can pose a challenge for producers. If the price elasticity of

> **"The virtuous circle does not itself guarantee socially inclusive or environmentally sustainable outcomes**

a product is greater than one, the increase in the quantity demanded more than compensates for the price reduction. Especially for industries with large room for technological advancement and/or economies of scale, a price reduction can be met by cost reduction by competitive producers. If a lower price leads to a higher demand, there is an opportunity for producers to increase profits, especially if they can maintain or increase the profit margin through innovation.

In contrast, there will be a greater challenge if a country's manufacturing output comes largely from commodified goods, for which the price elasticity is less than one. In this case, in a globalized market a price reduction does not stimulate enough demand to increase (or at least maintain) total revenue. In addition, commodifying products often offer limited scope for product or process innovation, so it is not easy to compensate for lower prices by reducing costs.

Low-cost production is a decisive factor for success in commodified and mature goods. Being a price taker and having a limited scope for productivity increase, a country needs to compensate for price reductions by increasing production volumes, which could increase its global market share even with stagnant growth of global demand for the product. Success in this way is not unusual, as seen in the rapid growth of previously low-income Asian countries specializing in labour-intensive industries. Chapter 4 examines the positive and negative aspects of relative price declines in world markets.

Social inclusiveness and environmental sustainability

The virtuous circle does not itself guarantee socially inclusive or environmentally sustainable outcomes. Social inclusiveness requires that at least two conditions are in place. First, part of the income generated by the circle should flow to the poorest people in society, increasing welfare at the bottom of the pyramid. Second, traditionally marginalized groups should be able to participate fully in the market.

Several global trends hinder these aspirations. When the largest share of income goes to highly skilled workers, the inclusiveness of the circle is weakened. The trend towards greater automation of production skews the distribution of profits towards factory owners and managers, to the detriment of workers. Excessive concentration of income at the top of the distribution also has detrimental effects on the circle's functioning, as a critical mass of income is needed to launch the process.

Without regulation, national or international, competitive pressures in global markets can undermine social inclusiveness. When cost competitiveness is achieved at the expense of labour standards, for instance, earnings and employment conditions can be severely affected, with adverse consequences on inclusiveness.[6] Indeed, the lack of sufficient material resources is a key contributor to social exclusion. In some instances, the competitive pressures faced by firms in export markets encourage child labour, as well as discrimination against vulnerable groups such as women, youth, migrant workers and people with disabilities (Naudé and Nagler 2015).

The liberalization of trade and production has heightened concerns over the trade-offs between price dynamics on global markets on the one hand and wages and employment conditions on the other. The unbundling of production tasks into global value chains has enabled firms in developing and emerging industrialized economies to increase their participation in world markets, creating significant opportunities for upgrading through knowledge transfer, learning-by-doing and learning-by-exporting for firms in developing countries and emerging economies (UNIDO 2015a). The off-shoring of unskilled and semi-skilled production tasks from industrial to developing economies has helped generate mass employment. It has also brought into the labour market segments of society that may have been previously excluded from it.

Employment conditions for low-skilled workers in suppliers within global value chains, however, may not meet international employment standards. The globalization of production appears to be increasingly associated with the emergence of casual

“The supply of greater product variety at affordable prices on global markets may come at the expense of social inclusiveness in exporting countries

contractual arrangements offering little social protection, especially in lower-skill segments of the value chain, where competitive pressures tend to be stronger, and in industries characterized by flexible production. Suppliers to global apparel firms, for instance, seem to rely on irregular workers alongside regular employees, with the former employed in lower-skill, time-sensitive segments of production, such as packaging or transport (Plank et al. 2012, Plank and Staritz 2016).

Irregular workers are often from vulnerable groups, such as migrant workers or women. Women employed by suppliers to lead firms in global value chains are generally young and unskilled. They tend to be employed in more labour-intensive and export-oriented segments of global production, such as the apparel and textile industries in low-income countries, where earnings are low and opportunities for skills upgrading limited (Caraway 2007). By contrast, men in these industries are more likely to work in skilled (and better-paid) occupations.[7] Women tend to be over-represented in more insecure, low-paid work, often in temporary or seasonal employment arrangements (Barrientos et al. 2011). When irregular and casual workers are over-represented by women, they often face a double form of discrimination at work, through their gender and their employment status (Plank et al. 2012).

A trend parallel to the increased casualization of employment is the rise in highly exploitative and even illegal employment forms, such as contemporary forms of forced labour, within certain niches of the global economy. A study of contract labour in the horticulture value chain finds that the seasonal, highly flexible nature of production in agro-industries tends to rely to a large extent on migrant workers who are denied legal employment benefits and forced to work in conditions of near slavery (Barrientos 2013). Similar conditions may emerge when suppliers sub-contract to informal firms or home workers. This kind of employment may be irregular and exploitative, including child labour (Barrientos et al. 2011, Zhao et al. 2016).

The supply of greater product variety at affordable prices on global markets may therefore come at the expense of social inclusiveness in exporting countries. The downgrading of employment conditions—especially in labour-intensive, lower-skill segments of global value chains—as well as the emergence of exploitative, if not illegal, employment arrangements, represent a significant challenge from the viewpoint of global welfare. Greater effort will be required from governments and the private sector to uphold labour standards and regulations, to ensure that all workers benefit from the opportunities offered by globalization.

More broadly, how inclusive the circle is at the global level depends on the extent to which countries benefit from its income-generation mechanisms, as well as the modality in which they participate. When countries remain caught in the lower segments of global production—or are left out altogether—the circle cannot be regarded as globally inclusive. Chapters 3 and 4 will analyse this point in further detail.

Sustainability also has to be taken into account, as discussed in Chapter 5; it is a vital part of social welfare. A trade-off arises between the massification of manufacturing production and the environmental sustainability of consumption. Improvements in energy efficiency and structural change could help reduce carbon dioxide emissions and material use per unit of value added, but they are not likely to be sufficient to reduce them as production volume grows. Along with further advances in greener production technology and its transfer, recycling and a shift in consumption to green products have to play a greater role in reducing the environmental impact of manufacturing consumption.

Notes

1. Their study is based on household surveys conducted in 13 countries: Côte d'Ivoire, Guatemala, India, Indonesia, Mexico, Nicaragua, Pakistan, Panama, Papua New Guinea, Peru, South Africa, Timor-Leste and United Republic of Tanzania.
2. In view of the low representation of industrialized economies in the sample of the Global Consumption Database, this group of countries is analyzed together with the emerging industrial economies. The inclusion of a disproportionately large number of developing countries in the sample is somewhat mitigated by the fact that the global distribution of income is highly skewed (peaking at a low income level), as Chotikapanich et al. (1997) show.
3. The correspondence between manufacturing industries and these product categories is detailed in Moneta and Stepanova (2017).
4. See, for example, Frenken et al. (1999), Saviotti and Frenken (2008) and Yeon et al. (2016). Saviotti et al. (2016) refer to "intra-sectoral differentiation" and inter-sectoral variety," which correspond to "related" and "unrelated" used in other studies. These are created by "post-innovation" improvements or "pervasive" innovations, respectively.
5. Frenken et al. (1999) compare unrelated variety with the concept of diversity in biology (the number of species in a habitat) or the number of genuinely different goods in an economy.
6. The International Labour Organization (2011) has codified four core international labour standards: freedom of association, the right to collective bargaining, abolition of child labour and elimination of discrimination at work.
7. Female participation in the manufacturing sector seems higher at lower levels of income and industrialization. As countries industrialize and get richer, female participation rates in manufacturing production appear to decline. See Kucera and Tejani (2014) for a comprehensive treatment of the issue.

Chapter 3

Capturing incomes from domestic demand for manufacturing

Domestic demand, income creation and industrial development

Initiating the virtuous circle of manufacturing consumption requires increased demand for locally produced manufactured goods. This demand can be domestic or foreign. A key aspect of the income-creation potential of demand is the roles the two sources play in the development process. Some countries rely more on their domestic markets; others put more emphasis on foreign demand. This relationship can also change through time, as observed in several developing countries during the 1990s or—in the opposite direction—in the recent rebalancing experience of certain large emerging economies, notably, China.

This chapter examines the domestic channels that lead to income creation along the virtuous circle detailed in Chapters 1 and 2. Its analysis shows that the domestic absorption is the most important component of final demand for manufacturing, at world level and across countries at different stages of industrialization. However, as countries get richer, the relative importance of domestic absorption diminishes and exports of manufactured goods tend to gain ground. The share of domestic absorption sourced from abroad (the purchase of final imported goods) and the foreign content of manufactures sourced locally also tend to increase as countries industrialize. As such leakages increase with development, spurring the value of domestic exports becomes key to sustaining the virtuous circle.

Income creation by domestic demand depends on the origin of this demand and on the chain of linkages connecting domestic and foreign suppliers. This chapter builds on multiregional input-output techniques to account for these linkages and assess the income creation potential of domestic demand for manufacturing goods. The results show that such demand is a key driver of income generation, especially in developing countries, and that its relative importance has been growing in recent years. The chapter examines the extent to which three forces—increases in real wages, the expansion of the middle class and the diversification of private household consumption—are related to the income created by domestic demand for manufacturing goods.

It finds a clear positive relationship between the three forces and the generation of incomes from domestic demand. To benefit from them, however, countries need a certain level of industrial capabilities: Countries with higher competitive industrial performance tend to benefit most.

One additional channel to take into consideration in the virtuous circle is related to the evolution of manufacturing prices and their impact on domestic consumers. Broad trends in consumer prices of selected manufactures in countries at different stages of industrial development support the finding that the relative price of manufactures tends to decline. Larger declines in relative prices are observed in industries with higher technological sophistication or greater exposure to foreign competition. Middle-income consumers tend to benefit most from these declines, because they allocate larger shares of their budget to goods that became relatively cheaper during the past decade. In this self-reinforcing process, expansion of the middle class fosters domestic demand for manufactures (and the income generation associated with it) and manufacturing development reduces the prices of the good consumed mostly by the middle class.

The last section of this chapter examines some policy implications, which Chapter 6 elaborates on. A general conclusion is that capturing incomes from domestic demand requires certain policies oriented to improving income distribution and social inclusiveness, strengthening real wages and building industrial capabilities in line with the expansion and diversification of domestic private consumption. The appropriateness of government interventions hinges on a variety of factors, ranging from a country's level of income and industrialization to its current factor endowment.

"Capturing incomes from domestic demand requires policies oriented to improving social inclusiveness and building industrial capabilities

The importance of domestic demand

For at least 25 years, domestic absorption has driven final demand for manufacturing, both at world level and across countries at different stages of industrial development.[1]

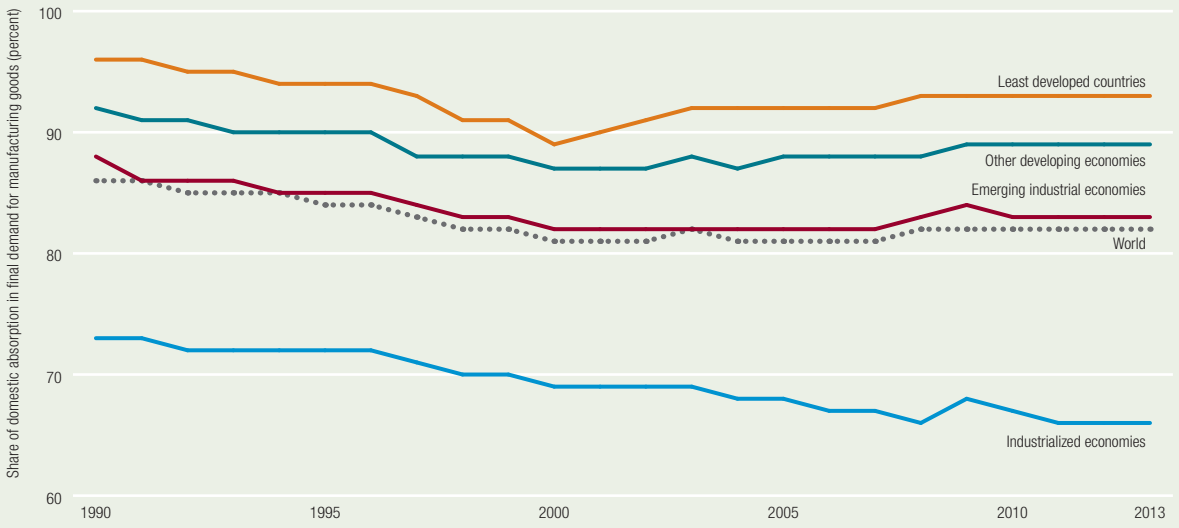
There are differences between country groups. More advanced economies tend to rely more on foreign demand, although domestic absorption remains by far the largest component. The share of domestic absorption in final demand for manufacturing goods in industrialized economies is much lower than the world average, and this difference has been growing. In 2013 domestic absorption represented about 84 percent of world final demand for manufacturing goods, but just 67 percent of industrialized country demand. In contrast, least developed countries (LDCs) rely most on domestic demand, which accounted for almost 95 percent of their final demand for manufactured goods (Figure 3.1).

Figure 3.1 also shows a declining trend in the importance of domestic demand, at the world level and for all country groups, pointing to the fact that globalization tends to make foreign demand increasingly important (Jalilian 2017). The share of domestic demand declined in all county groups in 1990–2000. Yet since 2000 the relative size of domestic absorption in developing and emerging industrial economies has been growing again. This change reflects an important shift in the global economy: the rebalancing of certain large emerging industrial economies, especially in Asia.

As countries get richer, the gap between domestic and foreign sources of demand shrinks: There is a clear negative correlation between the income level of countries and the relative importance of domestic demand for manufactured goods (Figure 3.2). At lower levels of income, countries tend to rely mainly on the domestic market. As income grows, foreign markets start playing a bigger role in fostering domestic industrialization (Jalilian 2017).

Private household consumption accounts for more than half of domestic absorption of manufactures in all country groups (Figure 3.3). The second-most important component is gross capital formation, which accounts for 32–37 percent of domestic absorption. Governments and non-profit institutions

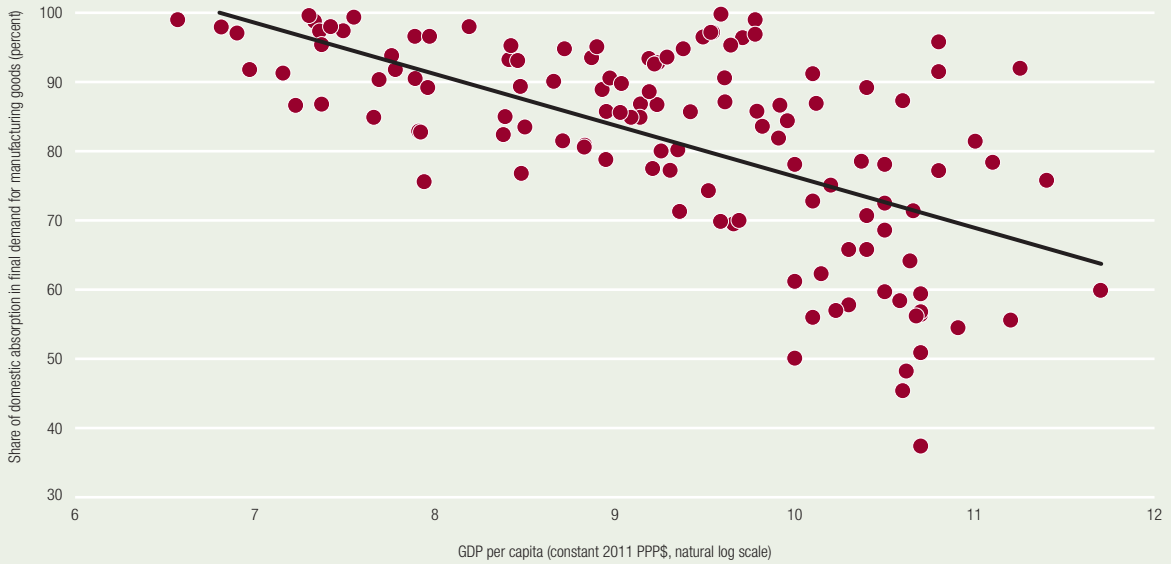
Figure 3.1
Changing trends in the relative importance of domestic absorption of manufacturing goods



Note: Domestic absorption comprises private household consumption, gross capital formation, and final consumption by governments and non-profit institutions (see Box 1.1 in Chapter 1). Each line shows the unweighted average of the indicator for the world and country groups. Industrialization level and manufacturing sector classifications are based on, respectively, Annex C1, Table C1.2. and Annex C2, Table C2.2.
Source: de Macedo and Lavopa (2017) based on the Eora Multi-Region Input-Output database (Lenzen et al. 2012; Lenzen et al. 2013).

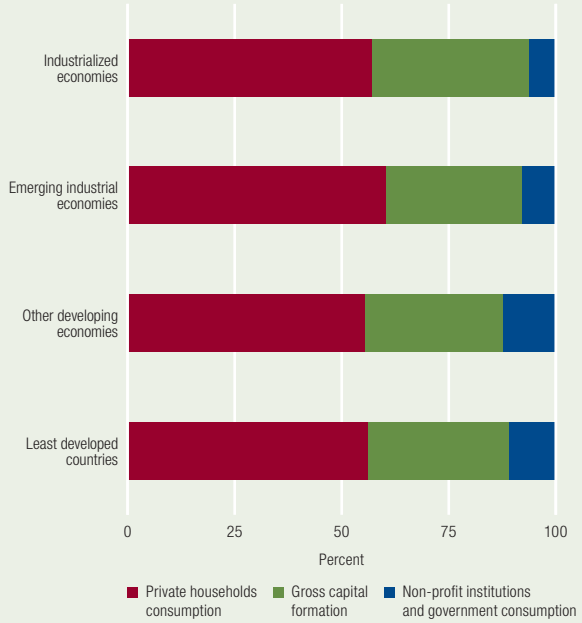
“Domestic demand leakages towards the consumption of foreign goods can curtail the potential income of domestic producers

Figure 3.2
Decreasing importance of domestic absorption of manufacturing goods as countries get richer



Note: Based on data from 2013. GDP is gross domestic product and PPP is purchasing power parity. See definition of domestic absorption in notes to Figure 3.1. Manufacturing sector classification is based on Annex C2, Table C2.2.
Source: UNIDO elaboration based on the Eora Multi-Region Input-Output database (Lenzen et al. 2012; Lenzen et al. 2013).

Figure 3.3
Private household consumption is the most important component of domestic absorption of manufacturing goods



Note: All values are for 2013 and in current $. See definition of domestic absorption in notes to Figure 3.1. Each bar shows the distribution by component of the domestic absorption for final manufactures. Values refer to the unweighted average by country group. Industrialization level and manufacturing sector classifications are based on, respectively, Annex C1, Table C1.2 and Annex C2, Table C2.2.
Source: de Macedo and Lavopa (2017) based on the Eora Multi-Region Input-Output database (Lenzen et al. 2012; Lenzen et al. 2013).

together account for 6–12 percent of domestic consumption of manufactures.

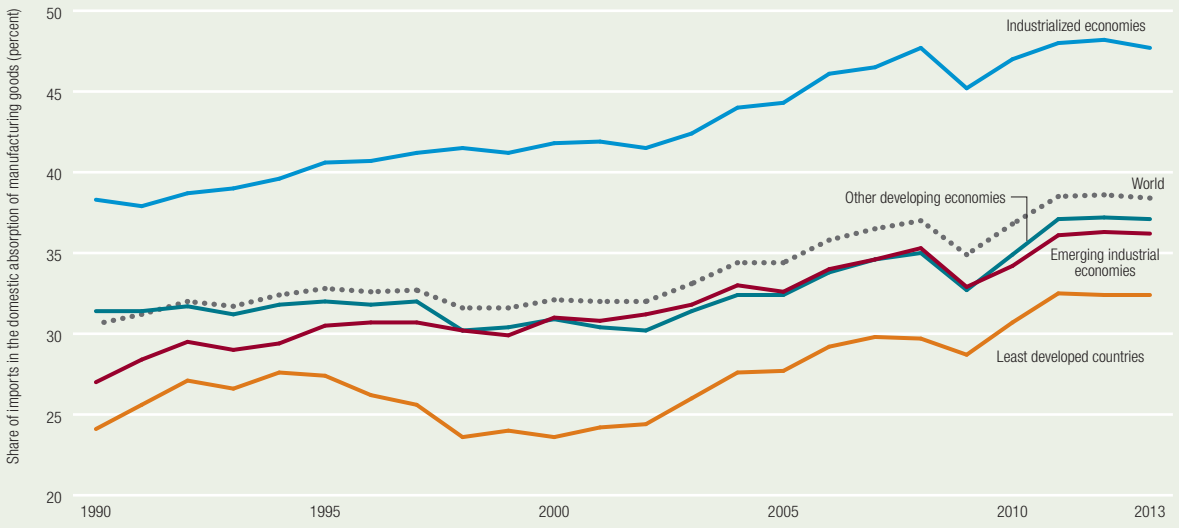
Leakages abroad and the foreign content of domestic production

Domestic demand leakages towards the consumption of foreign goods can curtail the potential income of domestic producers, with important repercussions on the income multiplier effects of demand.

A striking fact of global development in recent decades has been the increasing fragmentation of production across regions. This phenomenon is reflected in the increase in imported intermediates as a share of global production (see, for example, Gereffi 2015 and Sturgeon and Memedovic 2010). The increased interdependence across economies is also reflected in growing import shares in the final domestic absorption of manufacturing goods. Both at the world level and by country groups, the share of imported goods in final domestic absorption of manufactures has increased, particularly since 2000, despite a short slump during the global financial crisis (Figure 3.4).

“On average almost one-third of the total value of domestically produced final manufactures has a foreign origin

Figure 3.4
A widespread increasing share of imports in the domestic absorption of manufacturing goods



Note: Values are in current $. See definition of domestic absorption in notes to Figure 3.1. Each line shows the unweighted average of the indicator for the world and country groups. Industrialization level and manufacturing sector classifications are based on, respectively, Annex C1, Table C1.2 and Annex C2, Table C2.2.
Source: de Macedo and Lavopa (2017) based on the Eora Multi-Region Input-Output database (Lenzen et al. 2012; Lenzen et al. 2013).

More advanced economies have larger shares of imported goods (48 percent) than LDCs (32 percent). Richer consumers tend to be more integrated in world markets, because their demand patterns are more diversified and harder to fully source from domestic providers.

In a globalized economy, leakages are not limited to purchases of imported final goods: Even final goods that are produced domestically have components of foreign origin.

Components from abroad might bring positive effects to the domestic economy. They can boost productivity in importing firms that, taking advantage of global specialization, draw inputs from the technology frontier. Literature on international trade suggests that intermediate goods imports, embodying new technologies, can generate new knowledge within importing firms (Foster-McGregor et al. 2013). Imports can also raise productivity owing, more broadly, to their higher quality relative to domestic alternatives.[2] The purchase of components from abroad, however, would leak part of the income created in the production process towards foreign producers.

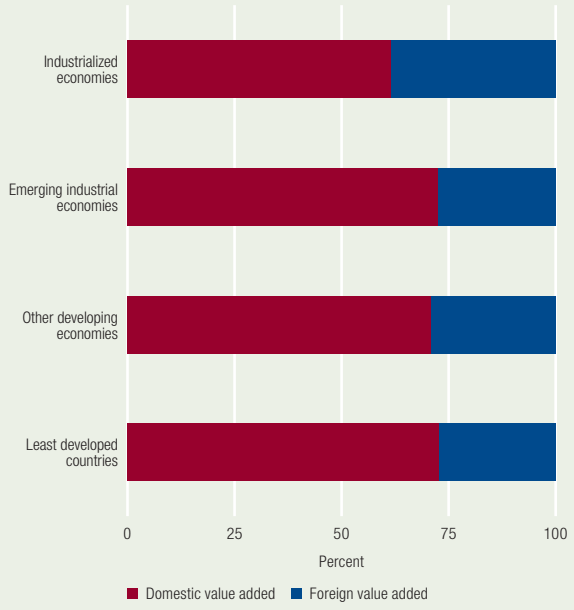
This sort of indirect leakage can be quantified by using input-output techniques. Applying these techniques to the Eora Multi-Region Input-Output database (Lenzen et al. 2012, Lenzen et al. 2013) reveals the domestic and foreign value added embodied in domestically produced manufactured goods that are absorbed by domestic demand (Figure 3.5).[3] On average almost one-third of the total value of domestically produced final manufactures has a foreign origin. This share is about 10 percentage points larger in industrialized economies than in developing countries.

This implies that countries tend to import more final goods as they get richer, and consumer preferences diversify from less sophisticated, domestically sourced goods. At the same time, the goods they produce domestically tend to draw increasingly from inputs and components sourced from abroad, as domestic production becomes increasingly integrated into global value chains.

Higher leakages of domestic demand together with increased foreign content in domestic production result in larger requirement of foreign exchange. A country’s foreign exchange requirements will thus generally increase rapidly with income.

“Multi-regional input-output tables make it possible to estimate the share contributed by each industry of each country to the final production of a good

Figure 3.5
Larger foreign value added embodied in domestically produced and absorbed final manufacturing goods in industrialized economies



Note: All values are in current $ and refer to the unweighted average by country group for the year 2013. See definition of domestic absorption in notes to Figure 3.1. Each bar shows the domestic and foreign value-added components of final manufactures produced and absorbed domestically. Industrialization level and manufacturing sector classifications are based on, respectively, Annex C1, Table C1.2 and Annex C2, Table C2.2.
Source: de Macedo and Lavopa (2017) based on the Eora Multi-Region Input-Output database (Lenzen et al. 2012; Lenzen et al. 2013).

Lack of foreign exchange might put pressure on the balance of payments and lead to external crisis. Domestic demand needs to be stimulated alongside domestic production capabilities and foreign demand, to avoid getting onto an unsustainable path for the external accounts (UNCTAD 2013b). In some instances, encouraging foreign investment, particularly offshoring production by firms in higher-income countries, can facilitate the emergence of export-oriented firms even in countries at very low levels of industrialization, providing them with the foreign exchange needed to finance imports.[4]

The contribution of domestic demand to income creation

Not all demand in the domestic economy generates local income. By the same token, some of the demand that originates outside the domestic economy generates local income, depending on the complex chain of productive linkages operating in the domestic economy and abroad, from local suppliers to final goods producers. This section analyses the roles of domestic and foreign demand in driving income creation.

Tracing the linkages

The approach to studying the income generated by the final demand for manufacturing builds on the traditional toolkit of input-output analysis applied to interconnected economies at the world level. A large body of literature examines the rise of global value chains by looking at trade in value added.[5]

The basic intuition of the approach is that final demand triggers a series of inter-linked sources of demand for intermediate inputs and factors that are needed for the production of that good. Value is added by certain industries in certain countries at each stage of production. The price paid by consumers for any good is the sum of each bit of value added along the process.

Multi-regional input-output tables make it possible to trace back all these intermediate demands and estimate the share contributed by each industry of each country to the final production of that good. Using this approach, it is possible to identify how much value different countries add towards the production of one good that is finally absorbed in one country.[6]

The approach also allows for measuring how much value one given country adds towards the production of all final manufactured goods worldwide.[7] It captures (from one country's point of view) how much domestic value added—and hence, income—is generated by catering to world demand for final manufactured goods (DVA_{MAFID}). Of that domestic value added, the analysis then breaks it down into the portion associated to final absorption taking place domestically (DVA_{MADA}) from that which takes place abroad (DVA_{MAFA}). All value created in an economy (its gross domestic product [GDP]) in one period is directly or indirectly tied to final demand done at home or abroad.

DVA_{MAFID} can be generated within manufacturing industries, or any other sector of the economy. The focus is not on the value added created in

"In developing countries, domestic demand is the main contributor to domestic value added; in industrialized countries, foreign demand is more important

manufacturing industries (the production-side perspective) but on the income created by the final consumption of manufactured goods (the demand-side perspective)—regardless of the sector in which this income (value added) is created.[8]

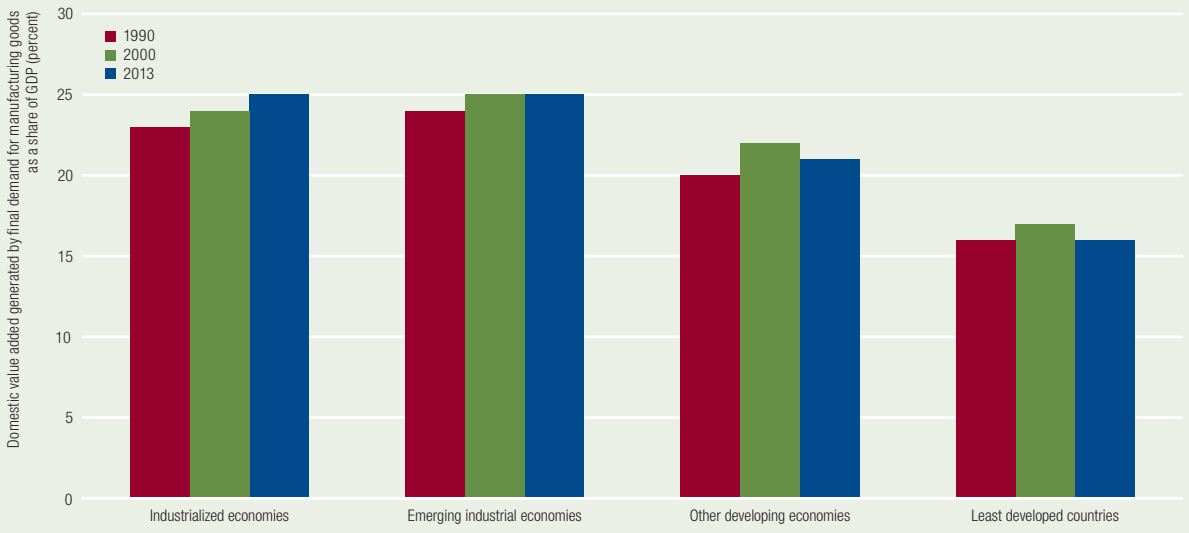
The shares of DVA_{MAFID} exceed the share of manufacturing value added (MVA) in GDP in all country groups and years shown in Figure 3.6. MVA (at current prices) accounted for about 20 percent of GDP in 1990, and 14 percent in 2014. The shares of DVA_{MAFID} range from 16 percent in LDCs to 25 percent in industrialized economies. In contrast with MVA, these shares increased between 1990 and 2013 in all country groups, with the largest increases occurring in industrialized economies.

Domestic value added is generated as a result of final absorption of manufacturing goods taking place both domestically and abroad, but the relative weight of the two components varies across country groups. In developing and emerging industrial economies, domestic demand is the main contributor to domestic value added. In contrast, in industrialized economies, foreign demand is more important (Figure 3.7). The contribution of domestic demand is particularly important in LDCs, where it accounted for more than 70 percent of DVA_{MAFID} in 2013. In all country groups the domestic share is declining, however, pointing to the growing global fragmentation of production.

The income generated by the final demand for manufacturing goods is a very important component of GDP. Over time and for all country groups it increases and tends to become more globalized. In emerging industrial and developing economies, however, the domestic component of final demand for manufacturing remains much more important than the foreign component.

Figure 3.8 presents the average annual growth rate of DVA_{MAFID} and the contribution of domestic absorption to growth in 1990–2000 and 2000–2013. It also indicates the average growth rate in different country groups and the average contribution of domestic demand. These averages provide a reference point for distinguishing four stylized cases: rapid growth with high reliance on domestic demand (quadrant I), rapid growth with low reliance on domestic demand (quadrant II), slow growth with

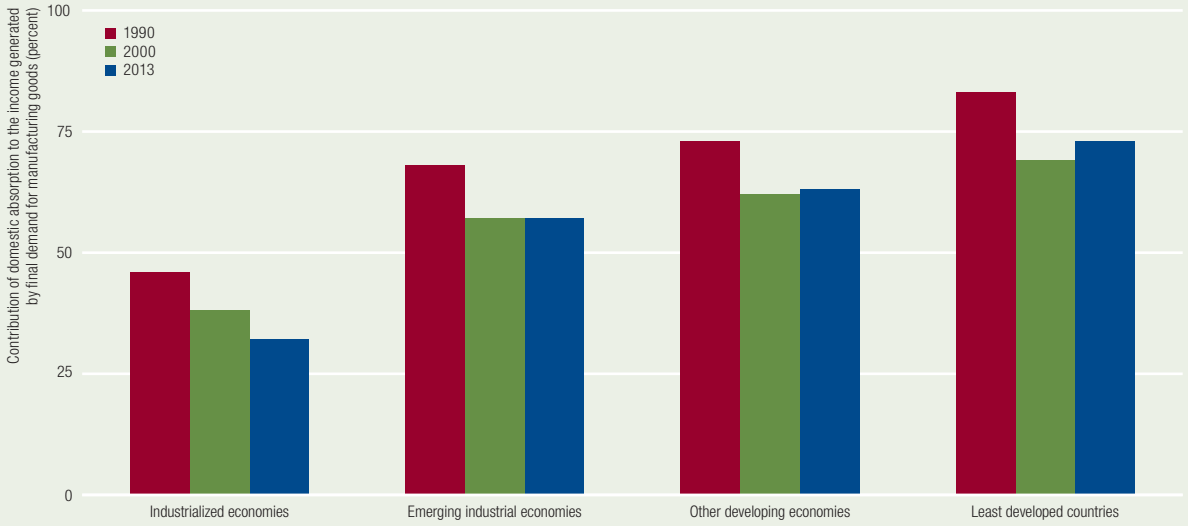
Figure 3.6
A significant share of GDP is generated by the final demand for manufacturing goods, especially in industrialized and emerging industrial economies



Note: All values are in current $ and refer to the unweighted average by country group for the year 2013. The height of each bar represents the share of domestic value added generated by manufacturing final demand in GDP (gross domestic product). Industrialization level and manufacturing sector classifications are based on, respectively, Annex C1, Table C1.2 and Annex C2, Table C2.2.
Source: de Macedo and Lavopa (2017) based on the Eora Multi-Region Input-Output database (Lenzen et al. 2012; Lenzen et al. 2013).

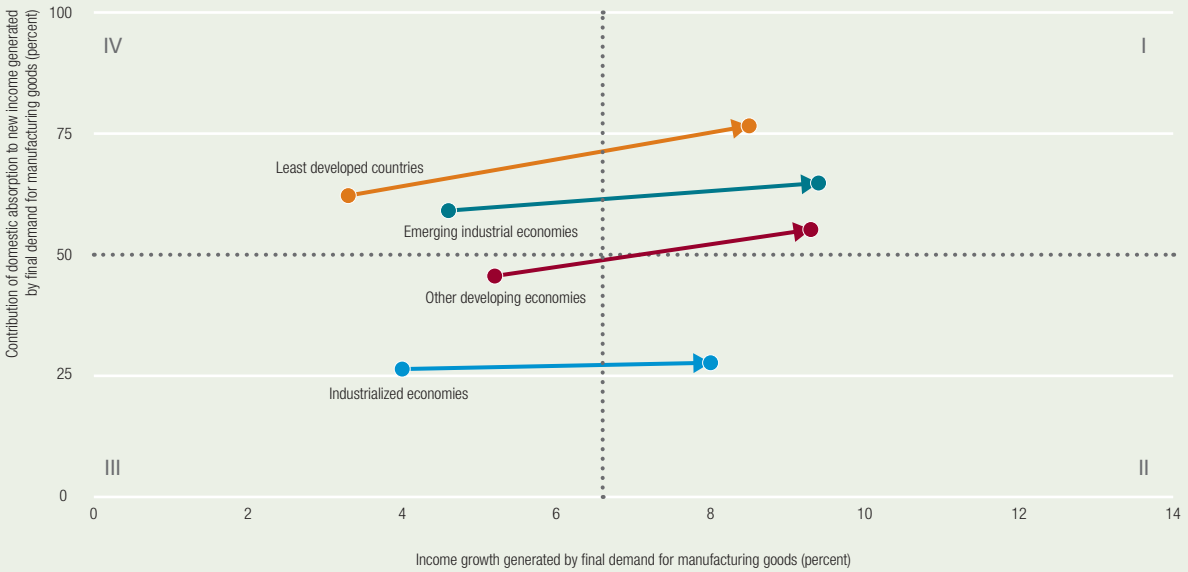
> **“The income generated by the final demand for manufacturing goods is a very important component of GDP**

Figure 3.7
Higher contribution of domestic absorption to the income generated by the final demand for manufacturing goods in less industrialized economies



Note: All values are in current $ and refer to the unweighted average by country group for the year 2013. See definition of domestic absorption in notes to Figure 3.1. The height of each bar represents the contribution of domestic absorption to the income generated by the final demand for manufacturing goods. Income is proxied by domestic value added. Industrialization level and manufacturing sector classifications are based on, respectively, Annex C1, Table C1.2 and Annex C2, Table C2.2.
Source: de Macedo and Lavopa (2017) based on the Eora Multi-Region Input-Output database (Lenzen et al. 2012; Lenzen et al. 2013).

Figure 3.8
Increasing impact of domestic absorption of manufacturing goods on income generation across all industrialization levels



Note: All values are in current $ and refer to the unweighted average by country group for the period 1990–2000 (starting value) and the period 2000–2013 (ending value). Growth refers to the annual compound growth rate of each period and income is proxied by domestic value added. See definition of domestic absorption in notes to Figure 3.1. Industrialization level and manufacturing sector classifications are based on, respectively, Annex C1, Table C1.2 and Annex C2, Table C2.2.
Source: de Macedo and Lavopa (2017) based on the Eora Multi-Region Input-Output database (Lenzen et al. 2012; Lenzen et al. 2013).

> **"The rapid acceleration of income creation by final demand for manufacturing goods has increasingly relied on domestic markets**

low reliance on domestic demand (quadrant III) and slow growth with high reliance on domestic demand (quadrant IV).

The rightward movement of all country groups in Figure 3.8 reflects the acceleration in the growth of nominal incomes generated by final demand for manufactured goods. The increase is larger for LDCs, where average annual growth increased from about 3.5 percent in the 1990s to almost 9.0 percent after 2000. (These rates are nominal figures, which include increases in both quantities and prices. Thanks to the commodity price boom, world inflation was higher beginning in the 2000s.[9]) The upward movement of non-industrialized country groups indicates that the rapid acceleration of income creation by final demand for manufacturing goods in these economies has increasingly relied on domestic markets.

Figure 3.9 breaks these figures out by region. Developing countries in Africa and Asia and the Pacific show similar patterns of high acceleration in growth rates and increased reliance on domestic demand. Countries in the latter region show the most rapid growth rates. Emerging industrial and developing economies in Latin America show slight declines in their growth rates and a marked increase in the importance of domestic markets. The group of other developing economies in Europe is the only country group in which the importance of domestic demand declined between the two periods.

Forces underlying the increase in the contribution of domestic demand

Three underlying forces lay behind the sharp increase in the contribution of domestic absorption to income

Figure 3.9
Trends in European demand for manufacturing goods differing from other geographical regions: Stable or decreasing contribution of domestic absorption

Note: All values are in current $ and refer to the unweighted average by country group for the period 1990–2000 (starting value) and the period 2000–2013 (ending value). Growth refers to the annual compound growth rate of each period and income is proxied by domestic value added. See definition of domestic absorption in notes to Figure 3.1. Regional, industrialization level and manufacturing sector classifications are based on, respectively, Annex C1, Table C1.1, C1.2 and Annex C2, Table C2.2.
Source: de Macedo and Lavopa (2017) based on the Eora Multi-Region Input-Output database (Lenzen et al. 2012; Lenzen et al. 2013).

“ Wages are an important driver of aggregate demand

generated by manufacturing demand: increases in real wages, the expansion of the middle class and the diversification of domestic consumption.

Increases in real wages

Wages are an important driver of aggregate demand. Empirical evidence shows that aggregate demand and productivity respond favourably to increases in wages as a share of GDP (Lavoie and Stockhammer 2013). And as gains in wage income are likely to be spent on consumption items, an increase in the wage share in GDP or an increase in real wages is expected to boost domestic demand, at least in the short run. The average annual growth rate of DVA_{MADA} during the period of high domestic demand–driven growth is positively correlated with the growth rate of real wages (Figure 3.10).

Expansion of the middle class

Closely linked to the increase in wages is the change in the distribution of income, in particular the growth of the middle class. More equal societies generate greater domestic demand, particularly manufacturing demand. Middle-income households allocate larger shares of their incomes to the consumption of manufactured goods (poor households tend to allocate more of their incomes to necessities, and richer ones towards services and luxuries).

Definitions of what constitutes middle-class status in the developing world—as well as estimates of its size—vary. But the share of the population in low- and middle-income countries with access to some discretionary income appears to have grown in recent years. A recent study estimates that the global middle class (defined as people living on $10–$20 a day) nearly doubled between 2001 and 2011, rising from 399 million to 784 million people (Kochhar 2015).[10] The size of the upper-middle class—those living on $20–$50 per day—also increased, boosting its ranks by 176 million people over the same period. Nearly 1.4 billion people had reached middle- or upper-middle class status by 2011 (Kochhar 2015).[11]

Figure 3.10
Increasing gains in real wages go hand in hand with income generated by domestic absorption of manufacturing goods

Note: All values are for the period 2001–2011. Income is in current $. Real wages are in 2011 PPP$ (PPP is purchasing power parity) and calculated from Penn World Table 9.0 by multiplying the share of labour compensation in gross domestic product (GDP) and the output-side real GDP at current PPP$ and dividing by the number of persons engaged. Growth refers to the annual compound growth rate of the period and income is proxied by domestic value added. Manufacturing sector classification is based on Annex C2, Table C2.2.
Source: UNIDO elaboration based on the Eora Multi-Region Input-Output database (Lenzen et al. 2012; Lenzen et al. 2013) and Penn World Table 9.0 (Feenstra et al. 2016).

> **“Extreme concentration of wealth at the top of the distribution may threaten the viability of the markets that support manufacturing firms**

The expansion of the middle class was not even across the world. Larger increases in the size of the middle class are associated with more rapid growth in incomes generated by the domestic absorption of manufacturing goods (Figure 3.11).

Rosenstein-Rodan (1943) was among the first to identify the emergence of a large internal market as a precondition for industrialization. Large markets enable the introduction of increasing returns to production technologies that could not have been profitably put to use otherwise. For industrial markets to expand, purchasing power needs to be concentrated in the hands of people who consume final manufactured products—namely, middle-class households (Murphy et al. 1989).

The emergence of a salaried consumer class therefore has significant bearing on a country's prospects for industrialization. In contrast, extreme concentration of wealth at the top of the distribution may threaten the viability of the markets that support manufacturing firms, with a stifling effect on industrialization. Greater inequality may result, for instance, in higher demand for luxury goods rather than domestically sourced consumer products (Chang 1997).

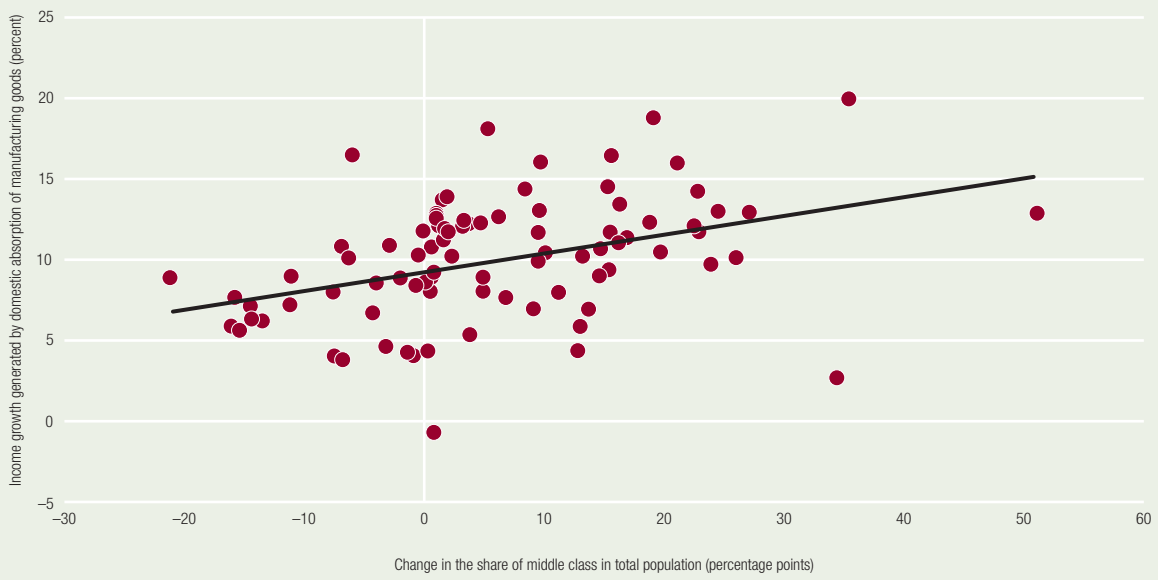
Diversification of consumption

The diversification of consumption baskets is also important. As seen in Chapter 2, the shift from basic necessities to more sophisticated manufactures sets in motion the virtuous circle of consumption.

Measuring the diversification of domestic consumption is not easy, especially across countries. Several international organizations have compiled and harmonized household data. A leading initiative is the International Comparison Program, led by the World Bank. Using 2005 and 2011 data compiled by this program, it is possible to estimate the degree of diversification of consumption baskets at the country level (Box 3.1). These proxies can be used to analyse the relationship between consumption diversification and income created by domestic demand.

The relationship between the diversification of domestic private household consumption and the creation of income from domestic demand is positive and

Figure 3.11
As the middle class grows, income generated by the domestic absorption of manufacturing goods rises



Note: All values are for the period 2001–2011. Income is in current $. Middle class is defined as the sum of middle and upper-middle classes in Kochhar (2015). Growth refers to the annual compound growth rate of the period and income is proxied by domestic value added. Manufacturing sector classification is based on Annex C2, Table C2.2.
Source: UNIDO elaboration based on the Eora Multi-Region Input-Output database (Lenzen et al. 2012; Lenzen et al. 2013) and Kochhar (2015).

> **"The shift from basic necessities to more sophisticated manufactures sets in motion the virtuous circle of consumption**

Box 3.1
Measuring changes in the diversity of consumption patterns

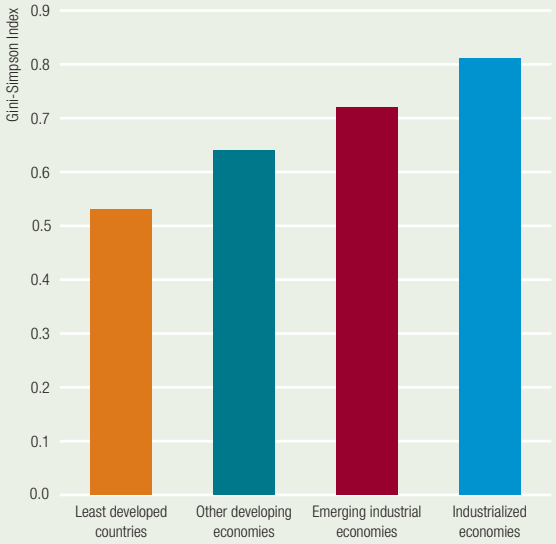
The Gini-Simpson Index can be used to quantify the diversity of consumption by capturing the probability that two-dollars' worth is spent on different goods.

Calculating the Gini-Simpson Index requires information about what and how much households consume. The World Bank's International Comparison Program provides data for 174 countries at a highly disaggregated level (108 consumption items).

Of the 108 consumption items in the International Comparison Program, 67 can be regarded as manufactured goods. These items are grouped into nine broad categories, based on their purpose. Box Figure 1 illustrates how countries at different stages of industrial development allocated consumption of these categories in 2011.

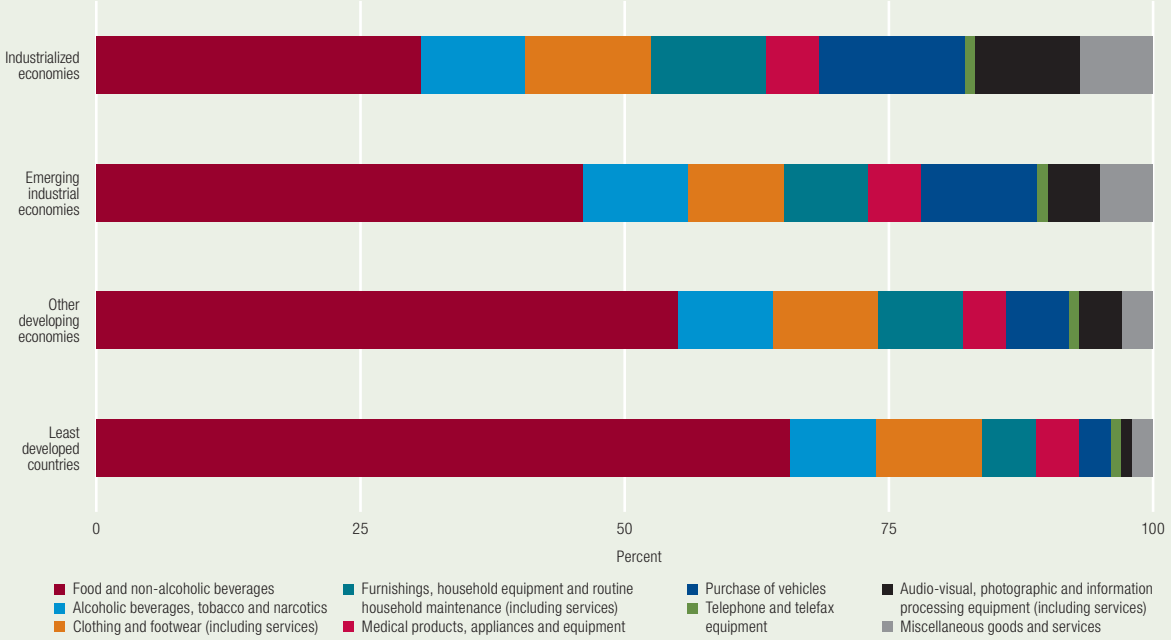
Based on this information, it is possible to calculate the Gini-Simpson Index of each country's basket of manufactured goods for 2011. Box Figure 2 shows a positive correlation between a country's degree of diversity in private consumption and its level of industrialization. The same procedure can be used to calculate the Gini-Simpson Index for 2005, and the absolute change between both can be used as a proxy for the diversification of consumption baskets during the period.

Box Figure 2
Diversity of manufacturing consumption increases with a country's industrialization level



Note: All values are for 2011. The Gini-Simpson index is calculated for the nine expenditure categories of manufactured goods presented in Box Figure 1. Each bar shows the unweighted average of the indicator for the indicated country group. Industrialization level and manufacturing consumption goods classifications are based on, respectively, Annex C1, Table C1.2 and Annex C4, Table C4.1.
Source: UNIDO elaboration based on the 2011 International Comparison Program dataset (World Bank 2015).

Box Figure 1
Higher industrialization levels associated with a smaller share of food in the household budget and a higher share of vehicles and recreational goods



Note: All values are for 2011 and are in current PPP$ (PPP is purchasing power parity). Industrialization level and manufacturing consumption goods classifications are based on, respectively, Annex C1, Table C1.2 and Annex C4, Table C4.1.
Source: UNIDO elaboration based on the 2011 International Comparison Program dataset (World Bank 2015).

> **Exploiting the opportunities created by a larger middle class requires industrial capabilities that allow domestic producers to serve higher domestic demand**

significant (Figure 3.12). Countries that diversified their consumption baskets the most between 2005 and 2011 tended to have the fastest annual growth rates of DVA_{MADA}.

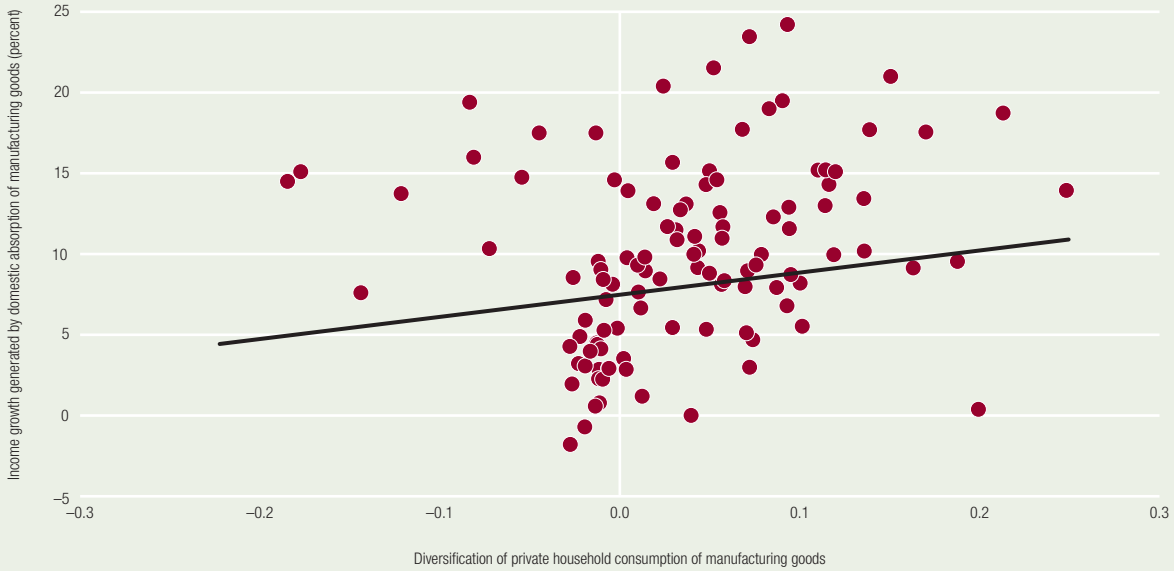
The importance of strong industrial capabilities

Exploiting the opportunities created by a larger middle class, higher wages and the diversification of domestic consumption requires industrial capabilities that allow domestic producers to serve higher domestic demand. One way of assessing the industrial competitiveness of countries is by looking at their relative position on UNIDO's Competitive Industrial Performance (CIP) index (see Chapter 8 for details). This index captures the ability of countries to produce and export manufactures competitively, and achieve structural transformation. It allows countries to benchmark the performance of their manufacturing sectors against that of other countries.

Countries that at the beginning of the period of high domestic demand growth (the early 2000s) ranked above the world median were more successful in capturing incomes from the expansion of the middle class, the increase in real wages and the diversification of demand, compared with countries that are ranked below the median rank. The positive relationship observed in Figures 3.10–3.12 is much stronger for countries with high CIP rankings (Figure 3.13). It is particularly clear in the cases of real wage growth (panel c) and diversification of consumption (panel e).

A precondition for the circle to work is a minimum level of domestic industrial capabilities. Without such capabilities, domestic demand will tend to leak towards consumption of foreign goods, particularly for new varieties of goods. There appears to be little relationship between consumption diversification and the creation of incomes from domestic demand in countries with low CIP indexes at the beginning of the period, probably because demand for new varieties

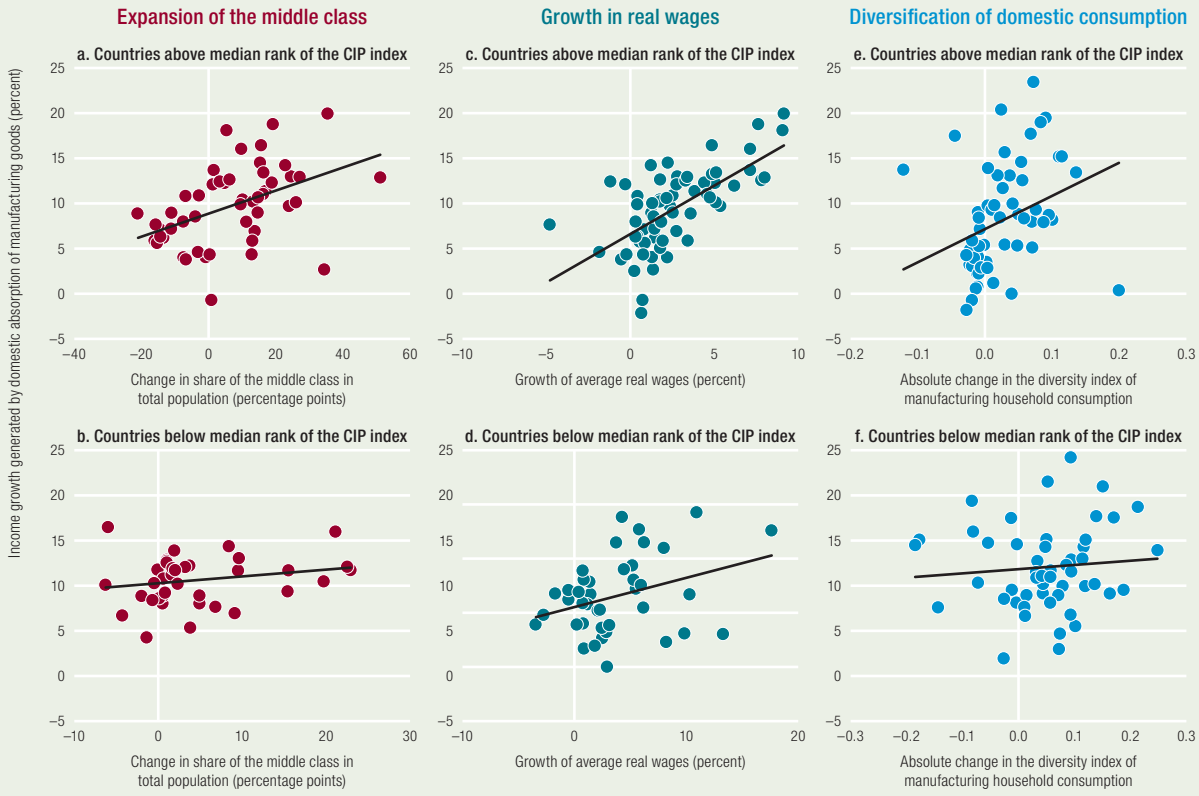
Figure 3.12
Incomes generated by domestic absorption of manufacturing goods are larger when consumption becomes more diversified



Note: All values are for the period 2005–2011. Income is in current $. Diversification in consumption is defined as the absolute change in the Gini-Simpson index of manufacturing consumption categories between years 2005 and 2011. See Box 3.1 for details. Growth refers to the annual compound growth rate of the period and income is proxied by domestic value added. Manufacturing consumption goods and manufacturing sector classifications are based on, respectively, Annex C4, Table C4.1 and Annex C2, Table C2.2.
Source: UNIDO elaboration based on the Eora Multi-Region Input-Output database (Lenzen et al. 2012; Lenzen et al. 2013) and the 2005 and 2011 International Comparison Program dataset (World Bank 2008 and 2015).

> **A precondition for the circle to work is a minimum level of domestic industrial capabilities**

Figure 3.13
High industrial capabilities are needed to benefit from middle class expansion, real wages gains and diversification of domestic consumption



Note: All values are for the period 2001–2011 in panels a, b, c and d, and for the period 2005–2011 in panels e and f. Income is in current $ and wages in 2011 PPP$ (PPP is purchasing power parity). GDP is gross domestic product. Income growth generated by domestic demand is estimated following the approach proposed in de Macedo and Lavopa (2017). Growth refers to the annual compound growth rate of the period and income is proxied by domestic value added. See Chapter 8 for details regarding the calculation and analysis of UNIDO's Competitive Industrial Performance (CIP) index. In the case of consumption diversification, because the measure used refers to 2005–2011, countries are split according to the CIP ranking in 2005. In all other cases, countries are split according to the CIP ranking in 2001. Manufacturing sector classification is based on Annex C2, Table C2.2.
Source: UNIDO elaboration based on the Eora Multi-Region Input-Output database (Lenzen et al. 2012; Lenzen et al. 2013), the 2005 and 2011 International Comparison Program dataset (World Bank 2008 and 2015), Penn World Table 9.0 (Feenstra et al. 2016) and Kochhar (2015).

of goods could not be sourced locally and therefore tended to create incomes elsewhere.

Second-order multiplier effects

The figures presented so far have looked only at the direct and indirect creation of incomes triggered by the final absorption of manufactured goods. They do not consider the induced channel of demand-driven income creation—that is, the incomes created by second-order multiplier effects when part of the value added generated is spent on additional consumption of goods and services.

It is difficult to capture these second-order effects, because they depend on the way wage and profit earners spend their incomes on consumption items. The pattern of spending depends on the level of income, which can change by the working of the circle (if, for example, an initial increase in demand stimulated sufficient income generation to move some consumers from one income segment to the next and alter their consumption patterns in line with the Engel dynamics described in Chapter 2).

A simple way of capturing these effects is to "close" the input-output model by making wages and final household consumption endogenous—that is, assuming that all wages are re-spent on consumer goods following the same (average) consumption pattern observed in the year of analysis (this type of multiplier

> **“Many factors affect the size of the multipliers, but wages appear key**

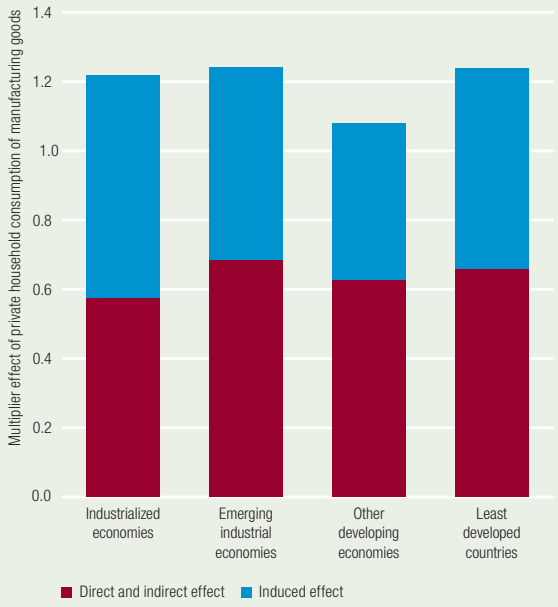
is known as a Leontief type-II multiplier). Applying this technique to the same sample of countries considered so far and using the Eora Multi-Region Input-Output database, Haider (2017) finds that these effects can be very significant. In 2013, for example, the induced effect is almost as large as the direct and indirect effect. It is apparent in all country groups, although it seems larger in industrialized economies. Taking into account all three effects, the average multiplier effect of domestic manufacturing consumption is about 1.20. It is largest in LDCs and emerging industrial economies (Figure 3.14).

Many factors affect the size of the multipliers, but wages appear to be key: The relationship between the size of the multiplier and the share of labour compensation in GDP is positive and significant (Figure 3.15).

Income creation and social inclusiveness

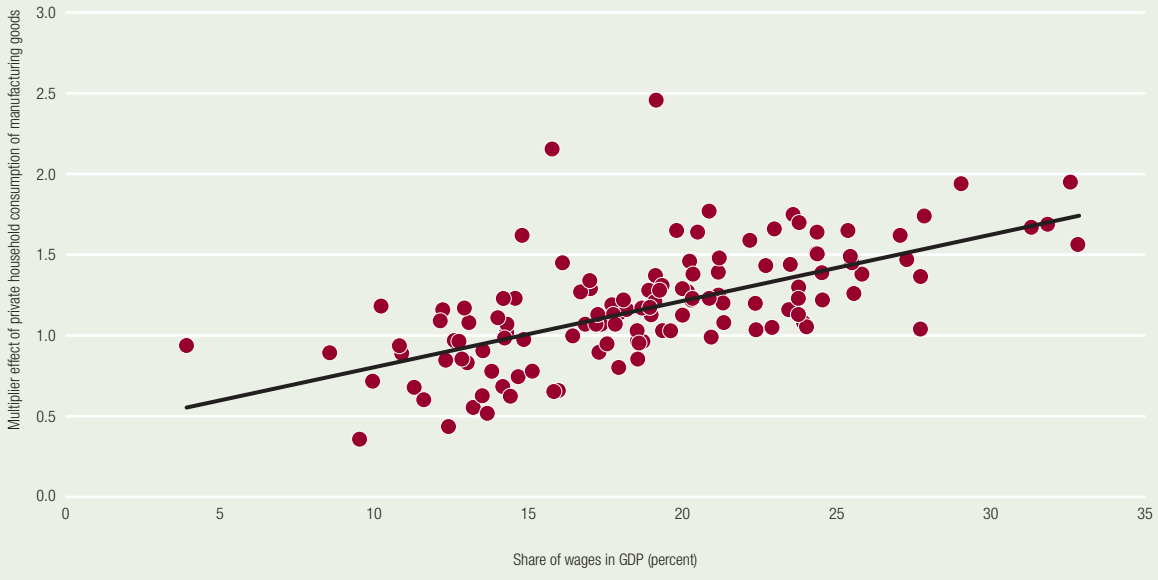
When sufficient industrial capabilities are in place, the circle of manufacturing consumption generates income continuously, either in a direct fashion—in the form of wages and profits—or indirectly, through

Figure 3.14
Multiplier effects of private consumption of manufacturing goods across industrialization levels



Note: All values are for 2013. The figure presents estimates based on 127 countries. Industrialization level classification is based on Annex C1, Table C1.2.
Source: UNIDO elaboration based on calculations by Haider (2017) derived from the Eora Multi-Region Input-Output database (Lenzen et al. 2012; Lenzen et al. 2013).

Figure 3.15
Higher wage shares in GDP accompanied by bigger multiplier effect of household manufacturing consumption



Note: All values are for 2013. Wages are in current $. GDP is gross domestic product. Manufacturing sector classification is based on Annex C2, Table C2.2.
Source: UNIDO elaboration based on calculations by Haider (2017) derived from the Eora Multi-Region Input-Output database (Lenzen et al. 2012; Lenzen et al. 2013).

> **“Social inclusiveness requires that such incomes flow to the poorest in society, increasing welfare at the bottom of the pyramid**

forward and backward linkages. Such incomes are re-spent, further raising household consumption and generating economy-wide increases in income and demand (Haider 2017).

Social inclusiveness—the generation of equal opportunities to contribute to, and benefit from industrial development—requires that such incomes flow to the poorest in society, increasing welfare at the bottom of the pyramid. It also requires the removal of constraints to participation in the market for women, youth, persons with disabilities, members of minority groups and others belonging to marginalized groups.

Government can help steer domestic consumption towards goods characterized by positive social impact. Examples include quotas in strategic public procurement for women-led enterprises, or preferential access and capacity building to social enterprises and SMEs, as discussed in greater detail in Chapter 6.

Domestic prices and purchasing power

Prices are one of the key channels through which changes in productivity translate into real income gains (or losses) for consumers (see Chapters 1 and 2). All other things equal, when productivity in an industry increases, production costs decrease. If firms in the industry face competition in product markets, output prices decline. If these conditions are in place, increases in productivity are passed on to consumers through lower prices.

The prices of manufactured goods tend to increase more slowly than the prices of services and other goods. Price trends in different industries also differ widely.

Figures 3.16 and 3.17 display the changes (in absolute values) in relative prices between 2003 and 2015. In most of the industrialized and developing economies considered, manufactured food products experienced the greatest relative increase in prices.[12] The relative price increase for manufactured food and beverage products appears to be much larger in developing economies than in industrial ones. This finding may partly reflect the impact of the sustained boom in commodity markets of the mid-2000s, which markedly increased prices for all resources, including food (Baffes and Dennis 2013, Foster-McGregor et al. 2017b). The substantial relative price increase of alcoholic beverages and tobacco may reflect increases in excise taxes.

In all countries considered, the prices for non-food manufactured products either decreased or increased more slowly than the overall price.[13] Exceptions include France, the United States, Mexico, South Africa (where prices of medical products appear to have increased relative to the prices of all other goods and services) and Japan (where prices of private vehicles experienced a slight increase relative to the rest of the economy).

The prices of all other durable and semi-durable consumer goods either decreased or rose at a slower than average pace. The most remarkable trend is in communication and information-processing goods.[14] In both industrial and developing economies, prices for durable high-tech goods such as mobile phones, audio-visual equipment and personal computers declined markedly over the past two decades.[15] Industries in which technological progress was marked also experienced slower prices increases (see Chapter 2).

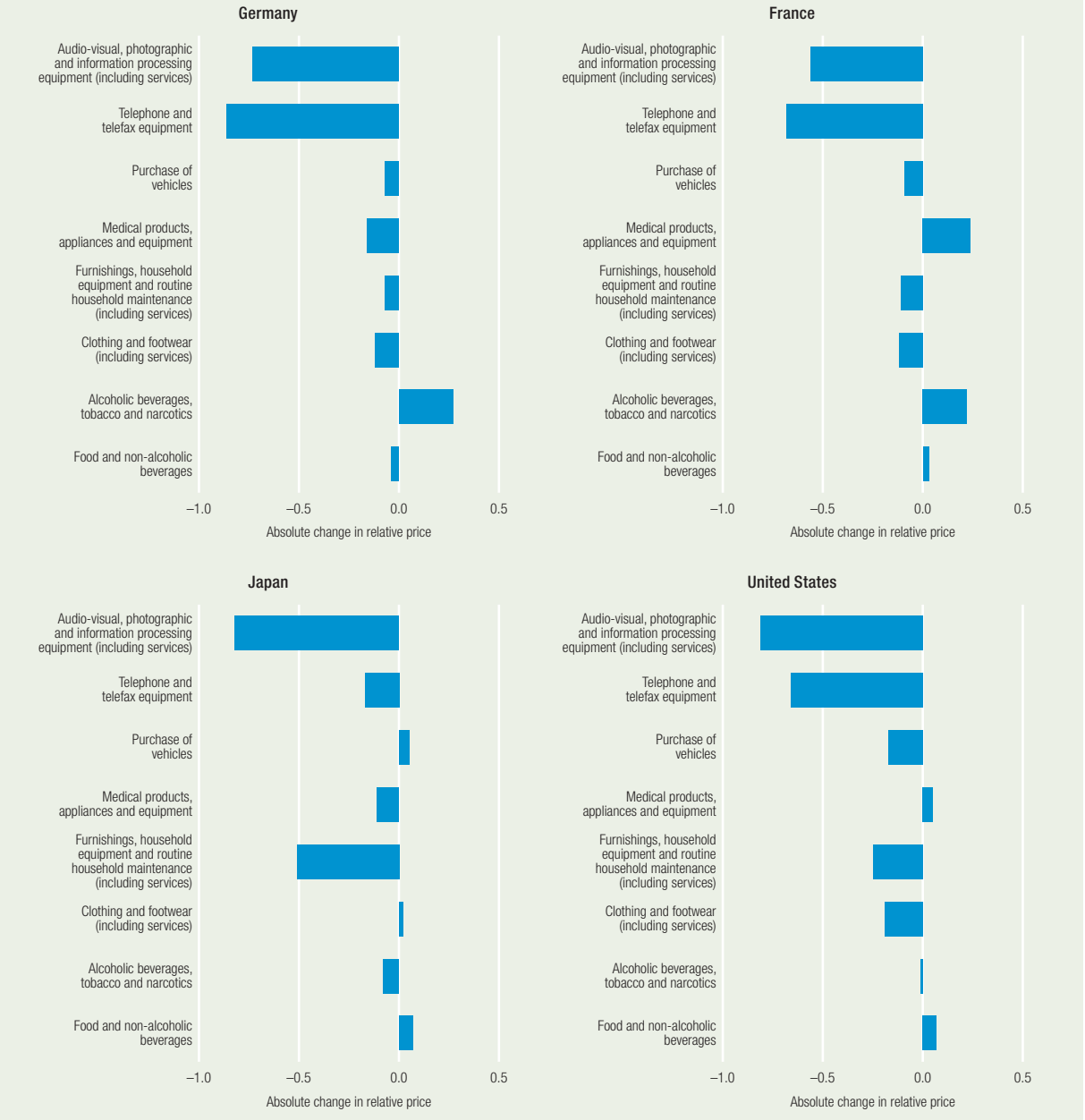
Trade is another important driver of movements in relative prices. It can affect the relative prices of goods and services directly, by influencing import prices. Over time, prices in sectors that are more heavily traded, such as manufacturing, may therefore grow at a slower rate—or experience a more significant decline—than prices of services.

Indirect effects are also important. The increased competition on product markets associated with openness to trade, for instance, is likely to reduce the mark-ups of domestic producers (Pain et al. 2008). The increased availability of cheaper intermediate inputs may also induce price moderation, in both domestically produced and imported goods.

Tables 3.1 and 3.2 show the proportion of final household consumption satisfied by imports for a set of manufacturing industries that are similar to the consumption categories considered in Figures 3.16 and 3.17. Import penetration ratios vary across

> **“The prices of manufactured goods tend to increase more slowly than the prices of services and other goods**

Figure 3.16
Large drops in relative prices of communication and information processing goods across selected industrialized economies

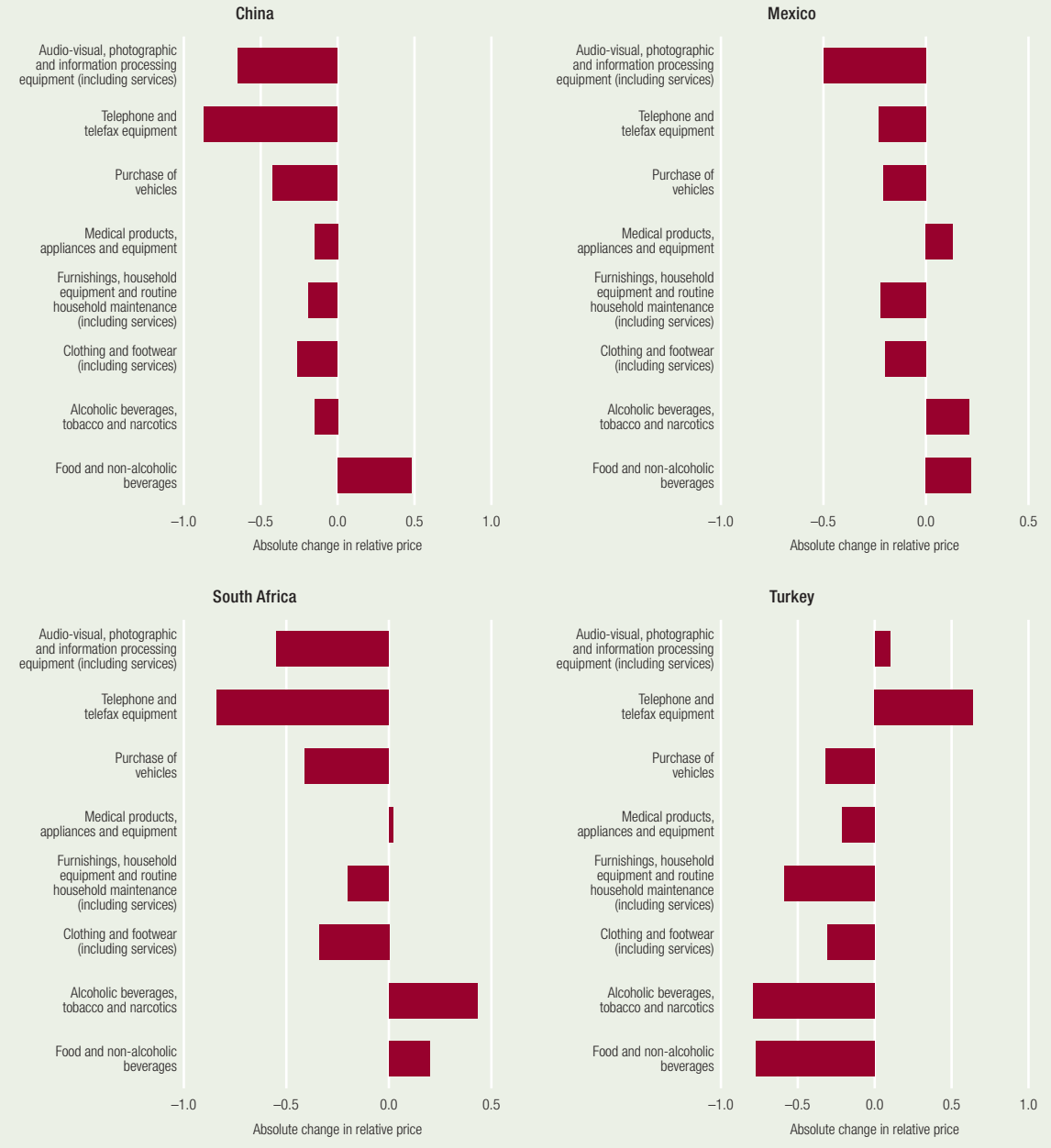


Note: All values are for the period 2003–2015. Absolute change in relative prices is estimated as the difference between the change in the aggregate consumer price index and the change in the corresponding consumption category during the period, normalized by the aggregate change. Manufacturing consumption goods classification is based on Annex C4, Table C4.1 (including additionally services where indicated in the legend). When countries report data in a different classification, the closest set of goods has been used.
Source: UNIDO elaboration based on Eurostat (2016), United States Bureau of Labor Statistics and Japan Statistics Bureau, Ministry of Internal Affairs and Communications website (www.stat.go.jp/english/data/cpi/1588.htm#his).

country groups. They are higher in industrialized economies than in emerging industrial economies. Differences are particularly marked in certain industries, such as textile products, leather and footwear. In industrialized economies, demand for clothing products appears to be satisfied largely by imports; in emerging industrial economies, consumption in this category appears to be predominantly domestic.

> **“Industries in which technological progress was marked also experienced slower prices increases**

Figure 3.17
Widespread reductions in relative prices across all key manufacturing categories but food and beverages in selected developing economies



Note: All values are for the period 2003–2015. Absolute change in relative prices is estimated as the difference between the change in the aggregate consumer price index and the change in the corresponding consumption category during the period, normalized by the aggregate change. Manufacturing consumption goods classification is based on Annex C4, Table C4.1 (including additionally services where indicated in the legend). When countries report data in a different classification, the closest set of goods has been used.
Source: UNIDO elaboration based on National Bureau of Statistics China (2016b), National Institute of Statistics and Geography of Mexico, Price Indices 2017, Statistics South Africa (2017) and Eurostat (2016).

These results are consistent with the earlier finding that imports are more important in industrialized economies than in other country groups (see Figure 3.4).

Substantial differences are evident across sectors. Industries in which consumption is more heavily directed towards imports are computer, electronic and optical equipment and motor vehicles. In all country

> **“Imported goods are more important in product categories in which prices experienced the slowest growth over the past two decades**

Table 3.1
Import penetration ratios for various final household consumption categories in selected industrialized economies, 2000 and 2011, and the change in this period

	France			Germany			Japan			United States		
	2000 (percent)	2011 (percent)	Change (percentage points)	2000 (percent)	2011 (percent)	Change (percentage points)	2000 (percent)	2011 (percent)	Change (percentage points)	2000 (percent)	2011 (percent)	Change (percentage points)
Food products, beverages and tobacco	14.4	18.8	4.4	15.1	18.1	3.0	7.3	10.1	2.8	5.4	7.6	2.1
Textiles, textile products, leather and footwear	47.5	80.7	33.2	60.0	65.5	5.5	24.1	49.5	25.4	36.3	65.4	29.1
Wood and products of wood and cork	22.6	26.3	3.7	18.2	17.0	–1.2	20.1	27.0	6.9	16.1	15.1	–1.0
Chemicals and chemical products (including pharmaceutical)	39.0	50.0	11.0	33.5	50.2	16.7	7.9	13.7	5.8	16.0	23.4	7.4
Electrical machinery and apparatus, n.e.c.	30.5	45.8	15.3	15.4	27.1	11.7	12.9	32.3	19.3	33.1	47.9	14.9
Motor vehicles, trailers and semi-trailers	36.0	42.8	6.8	24.3	24.4	0.2	2.9	3.3	0.4	28.7	34.7	6.0
Computer, electronic and optical equipment	56.9	70.0	13.1	56.8	48.2	–8.6	17.1	27.4	10.3	38.3	59.1	20.8

Note: Industry group classification is based on Annex C2, Table C2.3; n.e.c. is not elsewhere classified.
Source: UNIDO elaboration based on OECD (2017c), “Inter-Country Input-Output Tables, 2016 edition,” oe.cd/icio, (accessed on September 6, 2017).

groups, the share of imports is lowest for food products, beverages and tobacco and wood and products of wood and cork (3–30 percent).

Imported goods are more important in product categories in which prices experienced the slowest growth over the past two decades. It is unclear whether and to what extent trade may influence price dynamics in countries such as China, where import penetration ratios are low for all industries under consideration. In the European Union, Japan, South Africa and the United States, it is plausible that the greater trade integration of emerging industrial economies in world trade has dampened consumer price inflation. The European Central Bank (2006) finds that greater trade with China and other lower-cost economies lowered annual import price growth in the euro zone by an average of 2 percentage points between 1996 and 2005, depressing the growth of domestic prices.

Recent studies of the impact of import penetration on domestic price indexes in other industrialized economies provide further evidence in support of this trend. A study of the United States, for instance, finds that greater imports from China following its 2001 accession to the World Trade Organization (WTO) lowered the United States’ manufacturing price index by 7.6 percent between 2000 and 2006, after correcting for overall inflation in domestic and import prices (Amiti et al. 2017). Consumers gain from Chinese imports largely because of their impact on competitor prices and variety.[16] In Japan and South Africa, greater imports from China seem to have contributed to lower price growth thanks to greater variety and increased competitive pressures on domestic producers (see Edwards and Jenkins 2015 on South Africa, and Weinstein and Broda 2008 on Japan). The impact appears to have been more moderate than in the United States or the European Union, however.

“Changes in relative prices are likely to have different impacts at different levels of the income distribution

Table 3.2
Import penetration ratios for various final household consumption categories in selected developing countries, 2000 and 2011, and the change in this period

	China			Mexico			South Africa			Turkey		
	2000 (percent)	2011 (percent)	Change (percentage points)	2000 (percent)	2011 (percent)	Change (percentage points)	2000 (percent)	2011 (percent)	Change (percentage points)	2000 (percent)	2011 (percent)	Change (percentage points)
Food products, beverages and tobacco	2.6	2.7	0.1	6.0	9.4	3.4	5.6	9.9	4.3	4.2	4.0	–0.2
Textiles, textile products, leather and footwear	5.9	2.6	–3.3	29.4	30.1	0.7	16.0	20.3	4.3	9.6	9.1	–0.5
Wood and products of wood and cork	10.9	2.0	–8.9	17.5	25.0	7.5	24.4	17.2	–7.2	14.2	10.3	–3.9
Chemicals and chemical products (including pharmaceutical)	13.5	13.5	0.0	30.6	41.1	10.6	41.8	53.9	12.0	35.3	31.8	–3.5
Electrical machinery and apparatus, n.e.c.	8.4	7.2	–1.2	98.3	67.2	–31.1	34.3	33.6	–0.8	31.5	15.6	–15.9
Motor vehicles, trailers and semi-trailers	5.4	7.7	2.3	46.3	58.0	11.7	22.8	62.0	39.2	38.3	36.6	–1.7
Computer, electronic and optical equipment	25.8	29.8	4.0	47.6	67.2	19.6	97.6	81.2	–16.3	65.3	62.4	–2.9

Note: Industry group classification is based on Annex C2, Table C2.3. N.e.c. is not elsewhere classified.
Source: UNIDO elaboration based on OECD (2017c), “Inter-Country Input-Output Tables, 2016 edition,” oe.cd/icio,(accessed on September 6, 2017).

For a host of demographic, cultural and economic reasons, expenditures on different categories of goods vary widely across consumers. Because consumers belonging to different income segments exhibit very different consumption patterns, changes in relative prices are likely to have different impacts at different levels of the income distribution. A fall in the relative price of goods consumed more by the poor may result in a reduction in the real income gap between the rich and poor. A decrease in the relative price of goods consumed more by higher-income households would increase real income inequality.

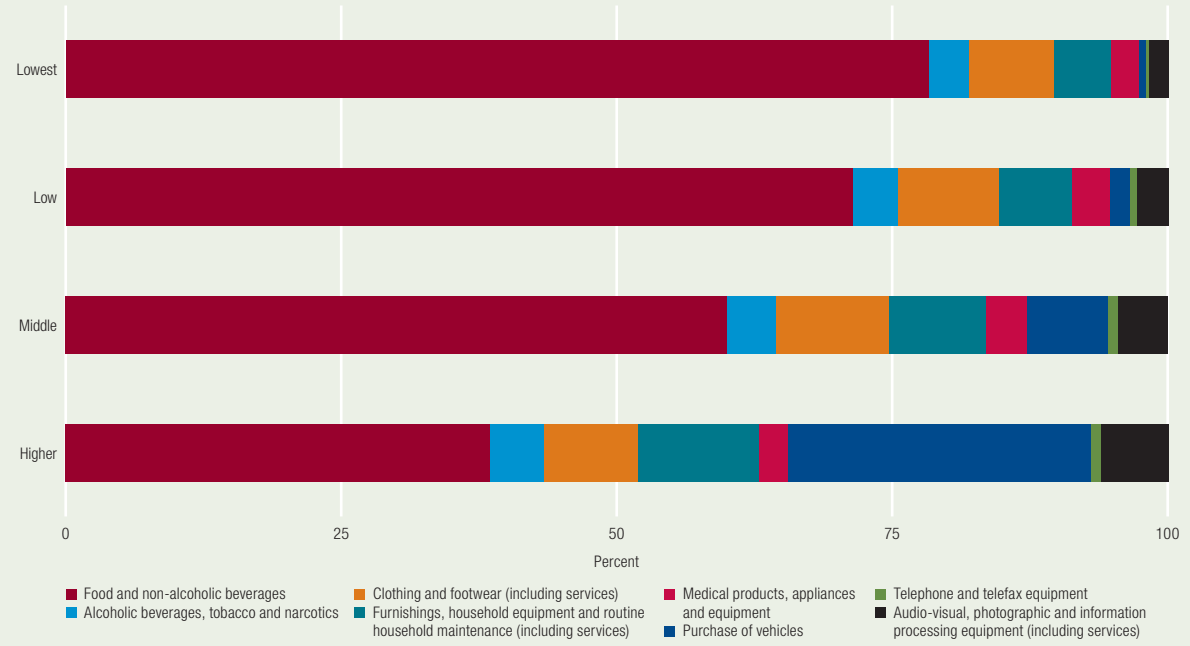
Information from household surveys can shed light on differences in consumption patterns. Information on countries in the European Union comes from Eurostat, which divides the population into income quintiles. Information on emerging industrial and developing economies comes from the World Bank’s Global Consumption Database, which divide the population into consumption quartiles (see Chapter 2).

Considerable differences in consumption patterns are evident across income groups (Figure 3.18 and Figure 3.19). These patterns appear to be consistent with findings on structural transformation: As income rises, the falling importance of agriculture is reflected in a fall in the consumption expenditure share in food categories (Duarte 2017). The opposite holds true for expenditure on durable goods and services.

Broad consumption patterns appear to be similar in the two groups of countries. Expenditure on information-processing and communication equipment (personal computers and mobile phones) is an exception. In the European Union households in all income quintiles appear to allocate roughly equivalent shares to the two categories. By contrast, in developing countries, consumption of these items increases markedly with income.

> **“Domestic demand for final manufactured goods can be a powerful driver of income creation in emerging industrial and developing economies**

Figure 3.18
Diversity of manufacturing consumption increases with average incomes across emerging industrial and developing economies...



Note: All values are for 2010. Average values are in current local currency units for the 88 developing countries included in the database. Income level classification is based on the income ranges defined by the Global Consumption Database (see Chapter 2, Figure 2.2) and manufacturing consumption goods classification is based on Annex C4, Table C4.1 (including additional services where indicated in the legend).
Source: UNIDO elaboration based on the Global Consumption Database (World Bank 2014).

Given these differences in consumption patterns across income segments, as well as across countries, movements in relative prices may have different distributional effects. In all country groups the prices of non-food manufactured goods grew at a slower pace than the prices of primary commodities, energy and services. This change benefited lower- and middle-income segments of society more than higher-income groups, because they allocate a large share of their expenditures to manufactured products (richer consumers spend more on services).

The prices of manufactured food products display a marked increase, especially in emerging and developing economies (see Figure 3.17). As a result, lower-income consumers—who spend more on food than on semi-durable and durable manufactured goods—may have experienced relative welfare losses. Movements in relative prices may have resulted in greater relative gains for the poor in industrialized economies, where food prices were stable, than in developing ones.

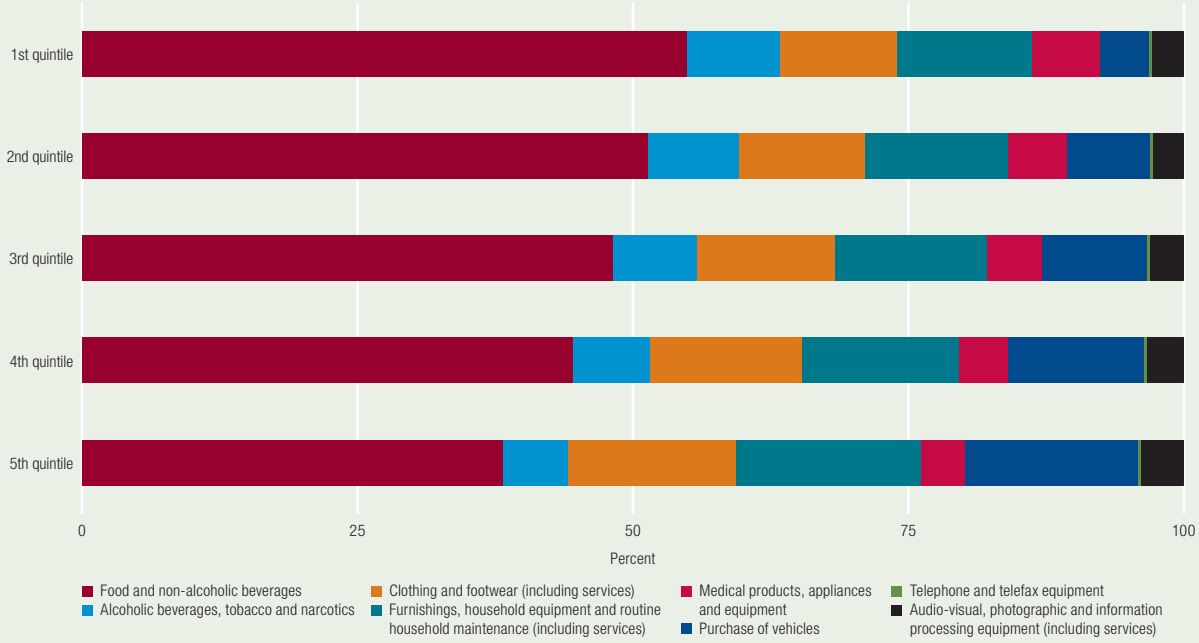
The distributional consequences of trade-related changes in relative prices may also differ according to country of residence. The empirical literature provides support to the notion that trade liberalization has a pro-poor bias in industrialized economies (Amiti et al. 2017, Broda and Romalis 2008).[17] Evidence on the impact of changes in relative prices in low- and middle-income countries is scarce.[18] A sizable body of empirical literature documents the impact of trade in low- and middle-income countries through the earnings channel.[19] The price channel has received less scrutiny. Further research is required.

Policies to foster domestic demand and industrial development

Domestic demand for final manufactured goods can be a powerful driver of income creation in

“Policy-makers can accommodate production structures and other complementary institutions in line with expected shifts in domestic demand

Figure 3.19
...and industrialized economies as well



Note: All values are for 2010. Average values are in local currency units for the 28 countries in the European Union. Manufacturing consumption goods classification is based on Annex C4, Table C4.1 (including additional services where indicated in the legend).
Source: UNIDO elaboration based on Eurostat (2016).

emerging industrial and developing economies —and its importance appears to be increasing. Domestic absorption of manufacturing goods has raised income in all country groups, with the partial exception of industrialized economies. Recent global trends—notably, weaker growth in countries in the Organisation for Economic Co-operation and Development (OECD) and the increase in the size of the middle class in many emerging industrial economies—partly explain the growing impact of domestic demand in driving growth and industrialization.

The drivers of domestic demand discussed in this chapter are hardly amenable to government action. The emergence of a salaried consumer class, shifts in a country's demographic structure and the distribution of income are all factors that play out over the very long run. Domestic demand can be understood primarily as a framework condition for industrialization, as discussed in Chapter 6.

Policy-makers may have little control over the evolution of domestic demand, but they are in a position to accommodate production structures and other complementary institutions in line with expected shifts in it. The opportunity represented by the emergence of a new group of consumers in a host of large emerging industrial economies is a case in point. Facilitated by the self-reinforcing circle of price and market-size dynamics, the expansion of a domestic middle class is accompanied by different sets of consumer preferences and spending patterns. Firms in emerging economies may be better placed than established market leaders in industrialized economies to take advantage of these new sources of demand (Lee and Malerba 2017). Location as well as market knowledge advantages can work in their favour.

In the context of a growing internal market for goods and services, governments can act as facilitators and partners in strengthening domestic productive capabilities. Policy intervention may be required, for

"Complementary measures can be introduced to ensure healthy growth in domestic demand

instance, to correct market failures. Industrial policy measures are warranted to lower the risks associated with innovation and ensure that domestic firms can take advantage of the asymmetric learning opportunities involved in the use of new technologies. Incentives for domestic producers can contribute significantly to the acquisition of capabilities and accelerate learning (Stiglitz and Greenwald 2014, UNIDO 2013, UNIDO 2015b).

The evidence surveyed in this chapter suggests that as countries grow richer, they become more integrated with the global economy. The growth in imports for domestic consumption, which accompanies processes of global integration, requires greater availability of foreign exchange. In the absence of robust export growth, movements towards rebalancing risk running into balance-of-payments difficulties (UNCTAD 2013b). Countries should therefore simultaneously adapt trade, exchange rate and industrial policy instruments to tap foreign—as well as domestic—sources of demand (see Chapters 4 and 6).

Industrial and trade policy instruments should be used only temporarily and based on performance (UNIDO 2013). The introduction of industrial policy instruments—especially subsidies, tariffs and non-tariff barriers to trade—is likely to lead to a gap between international and domestic prices. Policy-induced increases in the cost of living will probably reduce the welfare of lower- and middle-income segments of society, with potentially damaging consequences on consumption patterns.

Complementary measures can be introduced to ensure healthy growth in domestic demand. Over the short term, governments can employ fiscal tools to encourage an increase in household consumption. Over the medium to long run, changes to the institutional environment may be required. They can include labour market reforms and the establishment (or strengthening) of social protection systems.[20] Such reforms should seek to support wage growth and ensure that risks faced by households are pooled more widely, thereby reducing incentives for precautionary savings and encouraging private consumption.

A strategy focused on rebalancing a country's industrialization pattern towards domestic consumption is likely to encounter multiple challenges. Several factors can determine whether a domestic demand-oriented strategy works. They include the size of a country's domestic market; the distribution of income; and the extent to which national income leaks towards the consumption of imports or savings (Mayer 2016).

Not all countries face equivalent framework conditions. Government interventions to accommodate shifts in domestic demand will hinge on a variety of factors, ranging from a country's level of income and industrialization to its factor endowment. In an LDC, for example, where the majority of workers are in the rural economy or the informal economy, governments can partner with the private sector and international organizations to stimulate growth in agricultural productivity.

Policy interventions can steer demand in a more sustainable or inclusive direction. A host of regulatory interventions—ranging from price-based measures to behavioural nudges—can incentivize changes in consumers' spending patterns or steer investors in directions they may not have taken without regulation. Governments can adopt green and inclusive public procurement policies (see Chapter 6).

Notes

1. The terms "domestic demand" and "domestic absorption" are used interchangeably throughout the report to refer to the demand that takes place inside the domestic economy and comprises private household consumption, gross capital formation and final consumption by governments and non-profit institutions (see Box 1.1 in Chapter 1).
2. Available evidence confirms that a strong, positive relationship exists between importing and firm productivity. While the majority of studies focus on industrialized economies, the beneficial impact of importing seems to apply to developing country firms as well. Recent research provides evidence that importers across Sub-Saharan Africa do perform better relative to non-importers, provided that importing firms have appropriate levels of human capital (Foster-McGregor et al. 2013).
3. The Eora Multi-Region Input-Output database provides harmonized input-output and trade information for 187 countries for 1990–2013. The estimations in this chapter focus on economies with populations of at least 500,000 in 2013. Within this broad group some economies were excluded due to inconsistencies with other data sources in the composition of final demand reported by Eora. The sample finally used covers 127 countries, including 38 industrialized economies, 26 emerging industrial economies, 25 LDCs and 38 other developing economies.
4. Several export success stories in LDCs support this notion. Bangladesh's garment industry emerged in the late 1970s as a result of a joint venture between domestic entrepreneurs and the multinational company Daewoo, in the context of the Multi-Fibre Arrangement. Approved under the auspices of the General Agreement on Tariffs and Trade (GATT) in 1974, the Multi-Fibre Arrangement set bilaterally negotiated quotas on textile and clothing exports from developing to industrialized countries. As quotas did not cover LDCs that did not have a garment industry, the Multi-Fibre Arrangement incentivized established garment producers in emerging industrial economies to transfer capital and technologies to countries such as Bangladesh in order to continue serving industrialized economies' markets. Foreign know-how and strong government support to the industry facilitated its success (see Khan 2011). More recently, Ethiopia has developed a highly competitive floriculture industry, becoming Africa's second-largest cut-flower exporter (after Kenya). As it did in Bangladesh, foreign investment played a major role in the industry's development, by facilitating technology spillovers and acting as a conduit for penetration into international markets (Iizuka and Gebreeyesus 2017). Continued government support to overcome infrastructural bottlenecks and failures in markets for labour, land and capital also proved crucial for the industry's success (Oqubay 2015).
5. See Johnson (2014) and Los et al. (2015) for overviews of this literature.
6. This absorption can be by households (private consumption), the government (public consumption) or private enterprises (investment).
7. See de Macedo and Lavopa (2017) for an explanation of the approach.
8. Consider, for instance, private household consumption of automobiles. To produce automobiles, the car manufacturing industry will plausibly contribute most of the value generated. Yet other sectors of the economy—such as mining, or services—will also contribute by providing primary inputs for the production of steel, plastics, aluminum or rubber that will be used in the car's production, and the logistics and commercialization of the car.
9. Globally, the annual compound growth rate of the GDP deflator jumped from 1.1 percent in 1990–2000 to 4.3 percent in 2000–2013, according to the United Nations National Accounts Main Aggregates Database (UNSD 2016b).

10. The definition of middle-income status adopted by Kochhar (2015) is roughly comparable with that employed in the Global Consumption Database, which sets the middle-income threshold at $8.44–$23.03 daily per capita consumption (see Chapter 2).
11. The geographical distribution of middle-class growth over the past decade was highly heterogeneous. According to Kochhar (2015), China, followed by South America and Eastern Europe, witnessed the largest increases.
12. The countries considered include a set of upper-middle-income economies from various regions (China, Mexico, South Africa and Turkey) and four of the largest industrialized economies (France, Germany, Japan and the United States).
13. Manufactured goods are categorized according to their purpose, in line with the classification of individual consumption by purpose (COICOP), as employed by the International Comparisons Programme (see Annex C4, Table C4.1 for a comprehensive list of all products in the categories). Because the categories do not match exactly across countries, the comparisons should be taken only as indicative of the most important trends.
14. In Mexico information-processing equipment is bundled with other electronic equipment rather than with recreational items. In the United States, where the Bureau of Labor Statistics provides price data for more disaggregated product categories, personal computers were selected as the most representative category for the broader "information-processing and recreational goods" grouping.
15. In Japan and Mexico, prices of these products are bundled with prices for communication services, which probably explains the lower decline in these countries. In South Africa the relative price for 2003 includes postal services.
16. Amiti et al. (2017) focus on consumer welfare. Greater trade with China also appears to affect industrialized economies in other respects. Autor et al. (2013) find that expansion of trade with China reduced the relative wages of employees of firms and sectors that were more directly exposed to foreign competition in the United States. Acemoglu et al. (2016) estimate that China's export growth reduced overall employment growth in United States' manufacturing industries. Bloom et al. (2016) find that trade-induced technical change led to the reallocation of employment towards more technologically advanced firms in the European Union, resulting in a decrease in manufacturing employment, especially among low-skill workers.
17. The welfare impact of trade liberalization through the earnings channel appears more ambiguous. See note 16 above.
18. A notable exception is work on the distributional effects of trade liberalization in Mexico. A study of the impact of the North American Free Trade Agreement (NAFTA) on urban consumers from different income segments estimates that access to cheaper imported intermediate inputs sourced from the United States reduced the relative price of higher-quality products sold in Mexico, exacerbating inequality (Faber 2012).
19. See Goldberg and Pavcnik (2007) for a comprehensive review of issues treated in this strand of the literature.
20. Carefully designed minimum wage legislation can increase income from labour without necessarily affecting employment rates (Card and Krueger 1994, Schmitt 2013). Labour market interventions can, however, increase inflationary pressures and should therefore be accompanied by appropriate monetary policy. The introduction of complementary institutions, such as collective representation mechanisms, can also stimulate wage growth and increase job security. Data on collective bargaining in low- and middle-income countries are limited, but it seems to be associated with higher wages, lower wage dispersion and greater training opportunities (Freeman 2009).

Chapter 4

Capturing incomes from global demand for manufacturing

Global demand, income creation and industrial development

Global demand for domestic goods helps drive economic development, mainly through its impact on the economic growth process.[1]

This chapter examines the global channels that lead to income creation along the virtuous circle detailed in Chapters 1 and 2. Global demand for domestic manufacturing products is a critical vehicle for promoting industrial development and growth. Catering to global demand for one's products provides new incomes to local producers, which can fuel the virtuous circle of manufacturing consumption. Moreover, it provides the foreign exchange required to purchase imported goods and avoid running into balance-of-payments problems.

The extent to which these opportunities materialize depends largely on the relationship between the value of manufacturing exports and the price of imports. A measure that captures this relationship is the manufacturing income terms of trade (MITT). The MITT reflects the "purchasing power" of manufacturing exports—how much a country can import using the income generated by the exports of its manufacturing sector.

The analysis of the chapter shows that increases in the purchasing power of exports of manufacturing goods are positively correlated with income growth. Since several factors affect the purchasing power of manufacturing exports, however, the relationship between global demand for domestic goods and domestic incomes is not unidirectional. The three effects introduced in the virtuous circle diagram—variety, volume and price—crucially mediate the interplay between the two sides.

The evidence that the growth of export volumes and domestic incomes are closely correlated is undisputed. Volume and price effects are, however, linked and must be analysed together, as changes in export volumes are related to changes in prices and vice versa: If export volumes expand, international trade theory postulates that the terms of trade of countries that produce homogeneous products—or more generally its international purchasing power—will deteriorate, whether output expands thanks to technical change or factor accumulation (Acemoglu and Ventura 2002, Dornbusch et al. 1977). All else equal, to sell additional output on world markets, countries must lower their export prices.

A price-driven expansion of exports generates new incomes at home, where price effects can also have a positive impact on the disposable incomes of consumers. But the country will have to export more and more to import the same volume of commodities and services. This effect can be significant and intensify, as imports tend to increase as domestic incomes rise (as seen in Chapter 3). It can happen when prices of imported goods rise because of increases in domestic or global demand. A 10 percent decrease in the terms of trade as a result of lower export prices or higher import prices lowers the international purchasing power of a country by the same magnitude.

Generally, price effects depend on how exports react to global increases in income (the foreign income elasticity for domestic products); how imports react to a domestic increase in income (the domestic income elasticity for foreign products); how the demand for domestic goods reacts to price changes (price elasticity); the domestic conditions on the supply side in terms of factor conditions; and the variety of products a country exports. The complex interplay among these factors, and the potentially detrimental effects of declining terms of trade on a country's welfare, are a key concern in analysing the functioning of the virtuous circle of manufacturing consumption and industrial development in a globalized economy.

A quick review of the debate on the impact of manufacturing exports and development

A long research tradition stretching back to the 1950s has tried to establish the effects of injections of

"Catering to global demand provides new incomes to local producers, which can fuel the virtuous circle of manufacturing consumption

demand from abroad on domestic income generation. Traditionally, it has been difficult to establish a clear-cut causal link, as cross-country studies have been, and remain, plagued by empirical issues and have often examined the question only indirectly, via the effects of policy-induced barriers to international trade.

The Prebisch-Singer hypothesis is one of the first theories that links the reaction of domestic exports to global increases in income and developments in global prices. It postulates that if the exports of a country are either greatly inferior or basic products—that is, the quantity demanded of these products globally declines as global incomes increase—domestic producers will be forced to continually lower their export prices to sell their output abroad.[2]

The classical hypothesis traditionally considers primary products (unprocessed products from mining, forestry, fisheries or agriculture) as belonging to this category; it considers manufactured products as superior products. Export prices of primary products will also be negatively affected if markets are competitive and producers must pass on a larger share of gains from productivity growth than they would in markets with an oligopolistic market structure.

The theory also hypothesizes that technical change in the production of manufacturing goods in developed economies contributes to reducing the demand for scarce raw materials that command high prices, putting additional downward pressure on global prices. For given import prices, such developments drive down the barter terms of trade and with them the purchasing power of countries, making it harder to access the manufactured goods needed to promote economic and social development.[3] Balance of payment problems might ensue as a result. The classical Prebisch-Singer hypothesis considers this problem to be particularly harmful for developing countries that rely heavily on exports of primary goods. The upper part of Figure 4.1 summarizes the key arguments of this classical literature.

Because of the concerns emerging from the classical Prebisch-Singer hypothesis for primary commodities, in the past developing countries were advised to diversify their export portfolios into manufacturing products to boost their export earnings and improve their terms of trade. The assumption was that income elasticities are generally more favourable for manufactured products than for primary commodities.

As a raft of developing countries, mainly in Asia and Latin America, experienced rapid growth in manufacturing exports, new concerns have surfaced that the types of manufacturing products these countries export share some of the disadvantages of primary products relative to manufacturing goods. This point has been made especially in the "fallacy of composition" literature (see e.g., Mayer 2003), which has led to a "modified" Prebisch-Singer hypothesis (lower part of Figure 4.1).

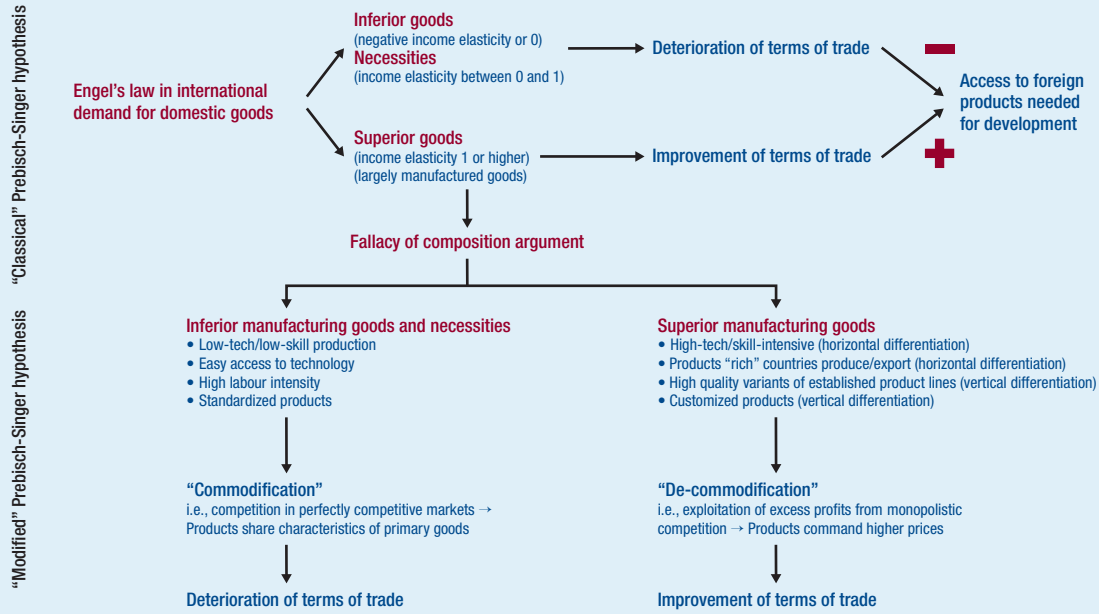
The modified hypothesis starts from the observation that developing and emerging industrial economies differ from industrialized economies in their technological capacity, institutional settings, labour markets and so on. Their manufacturing products therefore tend not to be technology intensive but labour intensive and easily imitated by other market entrants. This competition through entry puts downward pressure on global prices for manufactures, limiting the income-generation potential of foreign demand. In addition, embodied technical change through imported capital goods tends to decrease, rather than increase, prices. Under these conditions, an industrialization strategy designed to tap into global demand for manufactured products will not contribute to promoting wealth domestically.

For this reason, the literature has developed a more differentiated view of export-oriented industrialization to promote economic development, increasingly highlighting that successful industrialization requires a continuous process of structural change and active participation in dynamic, technology-intensive markets. In this way, developing countries can participate in markets with a high-income elasticity of global demand.

Debare and Lee (2010) explore these arguments empirically. They show that if factor accumulation makes a country expand faster than the rest of the

“Export variety is a crucial growth determinant, especially for low-income countries

Figure 4.1
The Prebisch-Singer hypothesis and the development of terms of trade



Source: UNIDO elaboration.

world, that country’s barter terms of trade will deteriorate. But they also show that growing world demand for a country’s export products can offset such a trend and eventually improve barter terms of trade. They argue that countries have ways to avoid adverse terms-of-trade effects by upgrading the quality and increasing the variety of their exports. In their opinion, only countries that persistently fail to innovate should experience a secular decline in their barter terms of trade.

This view means that variety effects are important for overcoming persistent declines in a country’s international purchasing power. Krugman (1989) established that persistent declines in barter terms of trade are unlikely, because fast-growing economies tend to face high income elasticities for their exports and low income elasticities for their imports, which tends to balance their terms of trade. He argued that these economies typically expand their share in world markets by expanding the range of goods they export rather than by lowering prices—that is, they try to engage in monopolistic competition by diversifying rather than engaging in price competition with other exporters. Many studies support this view (see, e.g. Funke and Ruhwedel 2001, Hallak and Schott 2011, Hummels and Klenow 2005, Schott 2004). Eicher and Kuenzel (2016) show that for low-income countries especially, export variety is a crucial growth determinant.

However, it is not just the variety of products that countries export that matters—technical change and upgrading are also needed. Lall (2001), for instance, argues that sound export structures are crucial for growth and development, with high-tech products generating the greatest benefits for exporters in terms of spillover effects, dynamically increasing returns (learning effects) and dynamism in world trade. Hausmann et al. (2007) argue that the quality of exports is a key determinant of economic growth and that developing countries should strive to produce the goods that industrialized economies make. In their view, diversification towards dynamic products or sectors is particularly important, as it limits the risk that the export market will become rapidly saturated and

> **“It is not just the variety of products that countries export that matters—technical change and upgrading are also needed**

that prices will decrease, while increasing the chances of exploiting the potential of long-term productivity growth associated with export-oriented industrialization. To be able to produce such products competitively, however, firms need to meet minimum productivity thresholds. Their capacity to do so depends on economic and social framework conditions and government policy (see Chapter 6).

Sutton and Trefler (2016) argue that countries should consider quality differences within specific product categories or industries (vertical differentiation), and that developing countries can increase their economic performance by improving the quality of their manufacturing exports. Hence, they argue, changes in the product mix as suggested by Hausmann et al. (2007) are not necessary to improve income per capita and economic performance, at least initially. The upgrading of existing structures may prove a better strategy, for once a developing country has reached higher quality levels in the products it already exports, it can then diversify into the more sophisticated and technologically intense varieties (typically exported by industrialized economies) by entering these product classes on the low-quality, low-price end of the quality ladder. For their part, industrialized economies should strive to diversify their product portfolio by generating new, high-value products as low-income countries enter these markets.

The debate is far from settled. Still, this review highlights the need to develop industrial policies alongside supportive macroeconomic conditions with the goal of capturing global demand for domestic manufacturing goods, in particular by targeting high-value segments in global markets, so as to balance or improve the terms of trade.

From a supply-side perspective, improvements in export unit values are typically seen as an upshot of innovation activities, which are important for capturing such global demand and triggering the virtuous circle outlined in Chapters 1 and 2. However, as demand-side aspects are vital too, this chapter examines the question: How can countries navigate shifts in global demand to secure high international purchasing power from exports and generate incomes domestically?

Increasing the purchasing power of manufacturing exports: Volume, price and variety

Manufacturing exports from least developed countries (LDCs) and other developing economies have gained considerable share in the global market (see Annex C1, Table C1.2 for the complete list of countries included in each group). Exports of (simple) manufactured goods from these two country groups have steadily increased even though at a much slower pace than those from emerging industrial economies. In most developing countries, they have overtaken the exports of primary commodities (Figure 4.2).[4]

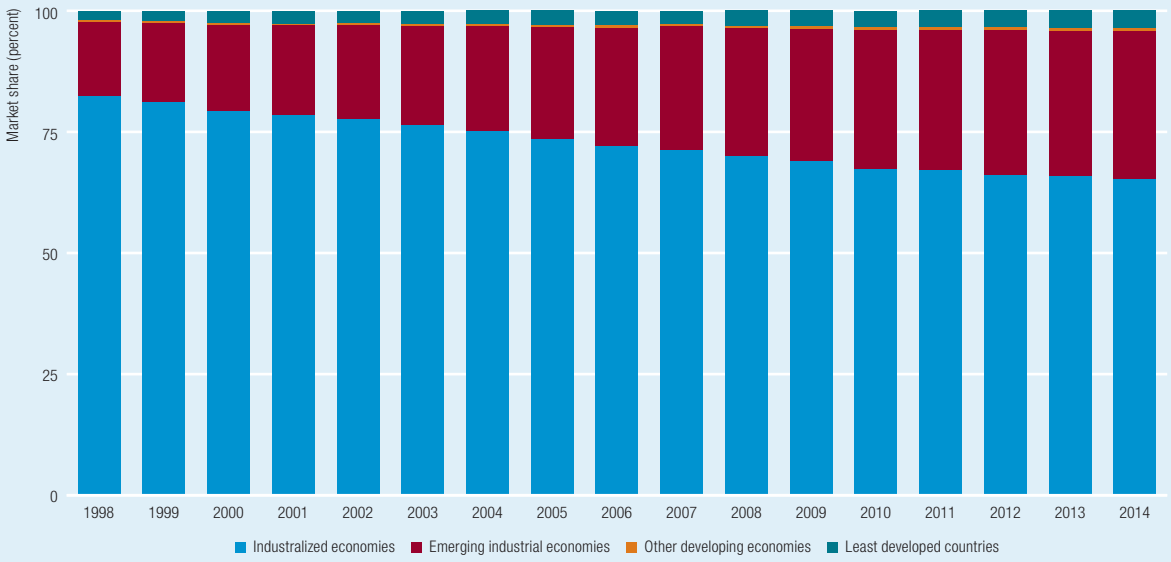
Given the increasing importance of manufacturing exports in the developing world, this section provides an overview on how volume, price and variety effects operate when economies attempt to capture domestic income from the expansion of global demand for manufacturing goods.

The analysis is done examining estimates of income terms of trade, which are defined as the export volume (index-based) of a country multiplied by its barter terms of trade (or alternatively as the value of exports divided by an import price index). This indicator captures both volume and price effects of trade; it provides an indication of the purchasing power of exports in terms of how much they can import. The focus will be MITT, which reflect the purchasing power of manufacturing exports. MITT are calculated from manufacturing export volumes and barter terms of trade (the pure ratio of export to import prices).

MITT are typically higher for industrialized than developing economies (as discussed below), but the two groups have converged somewhat over the past decade. MITT have improved faster in country groups that also experienced higher growth rates in per capita income during the period. Indeed, the data show that the country groups with the highest cumulative growth rates over the decade saw strong

“Failure to upgrade the quality of exports is accompanied by a deterioration of barter terms of trade in manufacturing

Figure 4.2
An increasing share of emerging industrial economies in global export markets for manufacturing goods



Note: Industrialization level classification is based on Annex C1, Table C1.2.
Source: Bykova et al. (2017) based on BACI International Trade Database (Gaulier and Zignago 2010) and The Trade Unit Values Database (Berthou and Emlinger 2011).

gains in their terms of trade and an increase in export volumes, whereas countries that grew more slowly experienced deteriorating terms of trade and export volumes.

Monopolistic competition and related increases in the variety and quality of the products countries export seem to be important for capturing global demand for domestic incomes (as shown below). The expansion of export volumes is closely related to changes on the extensive margin (i.e., the variety of exports in terms of active export lines). A higher technological content of exports runs alongside gains in the barter terms of trade in manufacturing; failure to upgrade the quality of exports is accompanied by a deterioration of barter terms of trade in manufacturing (Table A3.1 in Annex A3 provides a summary overview of volume, price and variety indicators and their evolution).

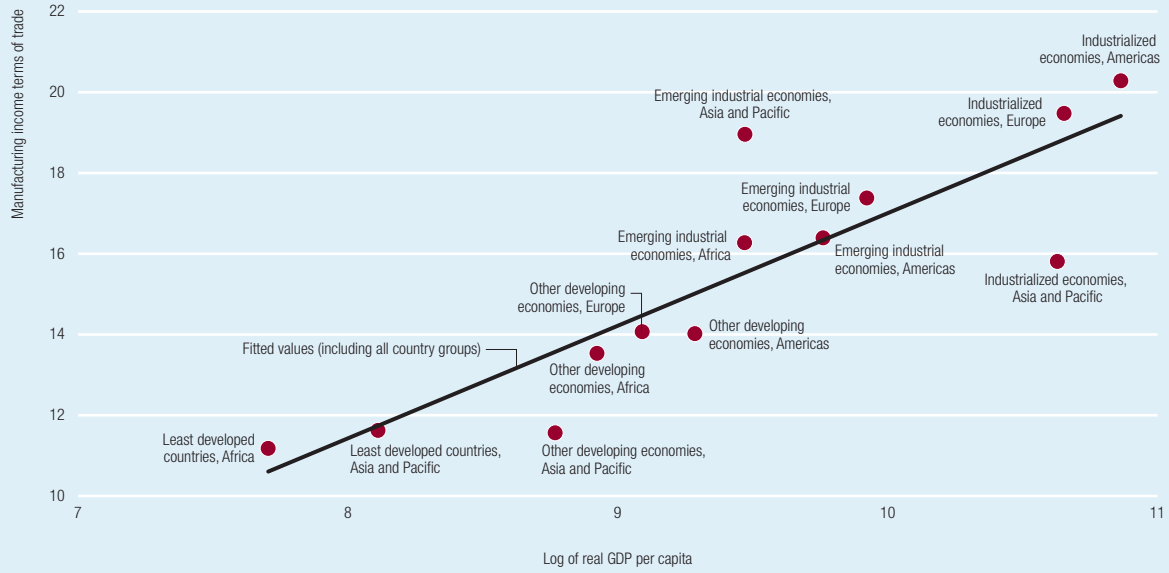
Manufacturing income terms of trade and economic performance

There is a close correlation between income and MITT (Figure 4.3). Countries with higher income levels (real gross domestic product [GDP] per capita) also have higher MITT, reflecting the purchasing power of exports in constant $.[5] This relationship exists because wealthier industrialized economies not only export more, they also export goods with higher technological content. The observations deviate farther from the regression line for three country groups in the Asia and Pacific region (industrialized, emerging industrial and other developing), indicating that the evolution of exports in these country groups has followed its own dynamics.

If instead of the absolute value of the MITT one looks at its changes during the last decade, the relationship shown in Figure 4.3 is inverted (Figure 4.4).[6] Countries with lower export values experienced stronger increases in their exports, and industrialized economies experienced more moderate increases. This pattern reflects convergence: Between 2003 and 2014, country groups that were not as strongly integrated in global trade integrated more quickly than already well-integrated ones. MITT improved fastest in LDCs in Asia and Pacific and slowest in industrialized economies across

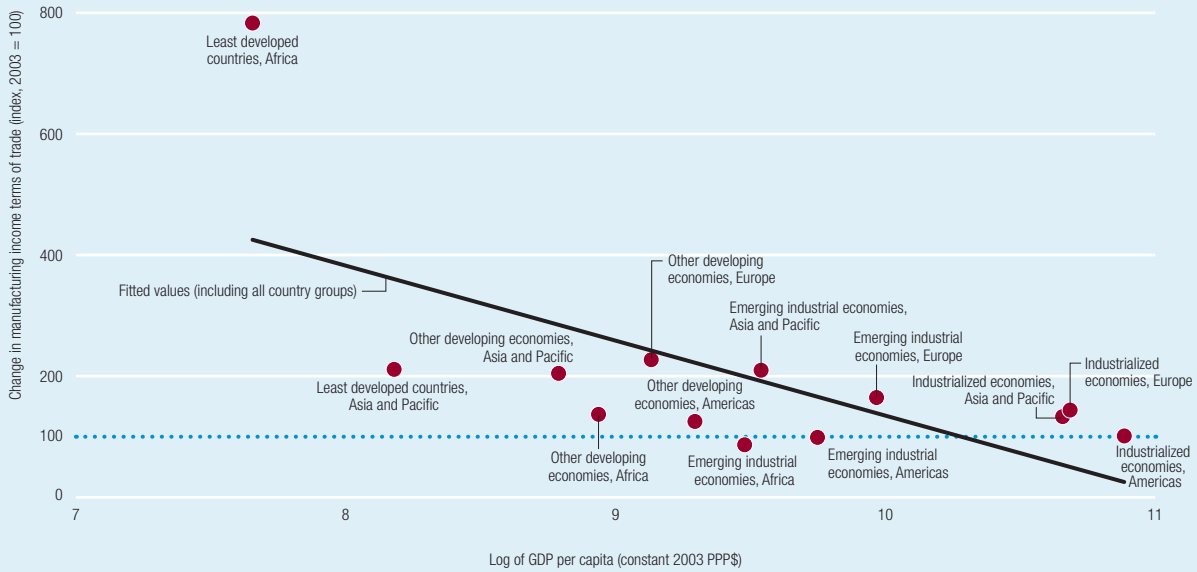
> **“Income terms of trade provide indication of the purchasing power of exports in terms of how much they can import**

Figure 4.3
Richer countries have stronger purchasing power of manufacturing exports



Note: All values are for 2014 and in constant 2003 PPP$. GDP is gross domestic product and PPP is purchasing power parity. Regional and industrialization level classifications are based on, respectively, Annex C1, Tables C1.1 and C1.2.
Source: UNIDO elaboration based on BACI International Trade Database (Gaulier and Zignago 2010).

Figure 4.4
Countries at lower incomes increased their purchasing power of manufacturing exports the most



Note: The change in manufacturing income terms of trade is for the period 2003–2014 and in constant 2003 PPP$ (PPP is purchasing power parity). GDP is gross domestic product. Regional and industrialization level classifications are based on, respectively, Annex C1, Tables C1.1 and C1.2.
Source: UNIDO elaboration based on BACI International Trade Database (Gaulier and Zignago 2010).

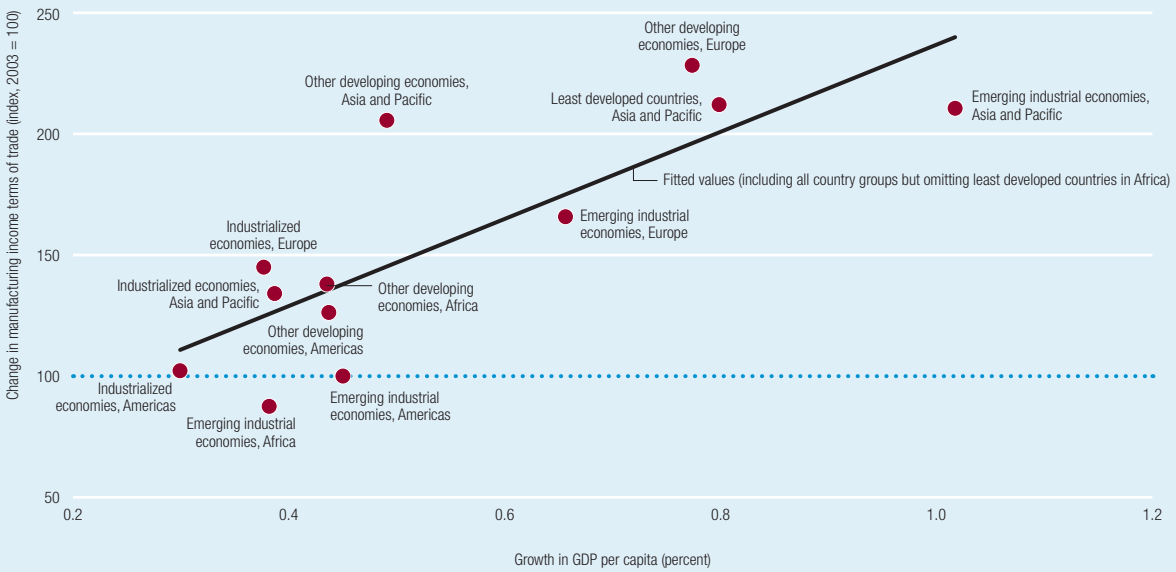
"Country groups that experienced faster growth of GDP per capita also improved the international purchasing power of their manufacturing exports

regions. MITT worsened for only three country groups—industrialized economies in the Americas, as well as the emerging industrial economies in Africa and the Americas—as evident from their position relative to the horizontal reference line at value 100 in Figure 4.4.[7] The correlation between income levels and the change in MITT is weaker than the correlation with MITT in constant money terms, indicating that the underlying dynamics of change in income terms of trade within country groups are very heterogeneous.

Across country groups, changes in MITT over the period of observation correlate positively with growth (Figure 4.5). Country groups that experienced faster growth of GDP per capita were also able to improve the international purchasing power of their manufacturing exports. Generally, country groups that grew faster over the period also improved their MITT more. However, there is considerable heterogeneity across country groups. For instance, other developing economies in Asia and Pacific experienced considerably stronger improvement of their MITT than, say, the emerging industrial economies in the Americas that grew at a similar pace over the period.

This heterogeneity can be studied further by examining how the components from which the changes in MITT are calculated (changes in manufacturing export volumes and changes in manufacturing barter terms of trade [MBTT]) correlate with GDP per capita growth. The relationship between GDP per capita growth and changes in the export volumes is positive (right panel, Figure 4.6). The relationship between GDP per capita growth and changes in MBTT is very weak and negative for the whole sample but positive if LDCs and emerging industrial economies in Asia and Pacific are not considered (left panel, Figure 4.6). Over the period, faster-growing country groups therefore experienced both a strong increase in export manufacturing volumes and an improvement in their barter terms of trade. LDCs and emerging industrial economies in

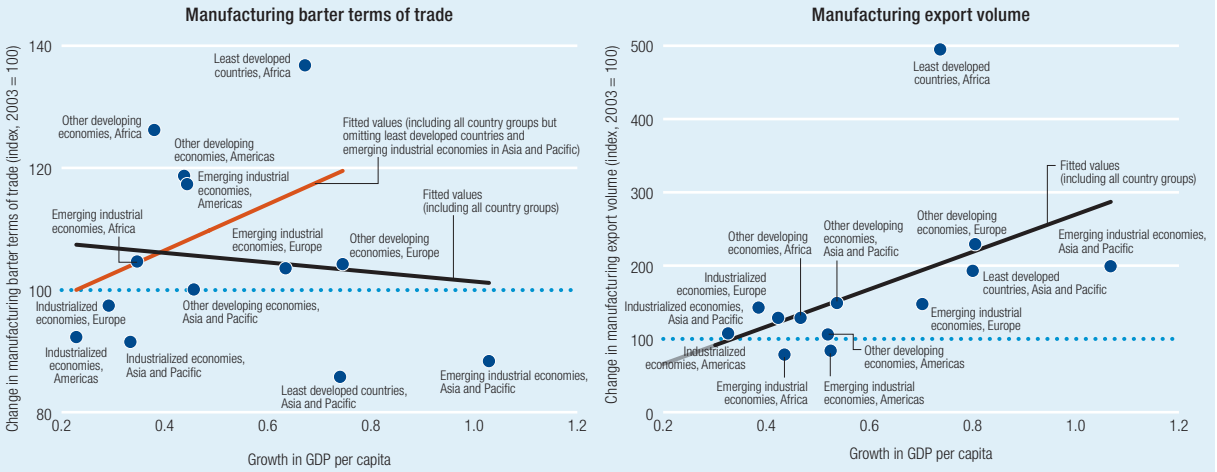
Figure 4.5
Increasing the purchasing power of exports is associated with higher growth rates in per capita GDP



Note: All values are for the period 2003–2014 and in constant 2003 PPP$ (PPP is purchasing power parity). GDP is gross domestic product. Outliers with changes of over 500 percent relative to the base year have been omitted. Regional and industrialization level classifications are based on, respectively, Annex C1, Tables C1.1 and C1.2.
Source: UNIDO elaboration based on BACI International Trade Database (Gaulier and Zignago 2010).

> **To drive export growth, countries tend to take advantage of global demand for new varieties as well as demand for existing varieties**

Figure 4.6
Relationship between GDP per capita and changes in manufacturing barter terms of trade and manufacturing export volumes



Note: All values are for the period 2003–2014 and in constant 2003 PPP$ (PPP is purchasing power parity). GDP is gross domestic product. Regional and industrialization level classifications are based on, respectively, Annex C1, Tables C1.1 and C1.2.
Source: UNIDO elaboration based on BACI International Trade Database (Gaulier and Zignago 2010).

Asia and Pacific, however, experienced high growth rates alongside decreases in the MBTT. Very different processes seem to drive the relationship between MBTT and economic growth in these two country groups.

The emerging industrial economies in the Asia and Pacific region increased their export quantities only moderately, and their terms of trade declined over the period. In contrast, the LDCs in Africa considerably scaled up their export quantities and strongly improved their manufacturing terms of trade. In the light of price, volume and variety effects, these patterns indicate that the former group seems to have increased its export volumes by lowering prices and the latter did so by increasing export prices. The same trends can be seen for the other developing economies and emerging industrial economies in Europe, though at more moderate levels. (These patterns are examined in greater detail below.)

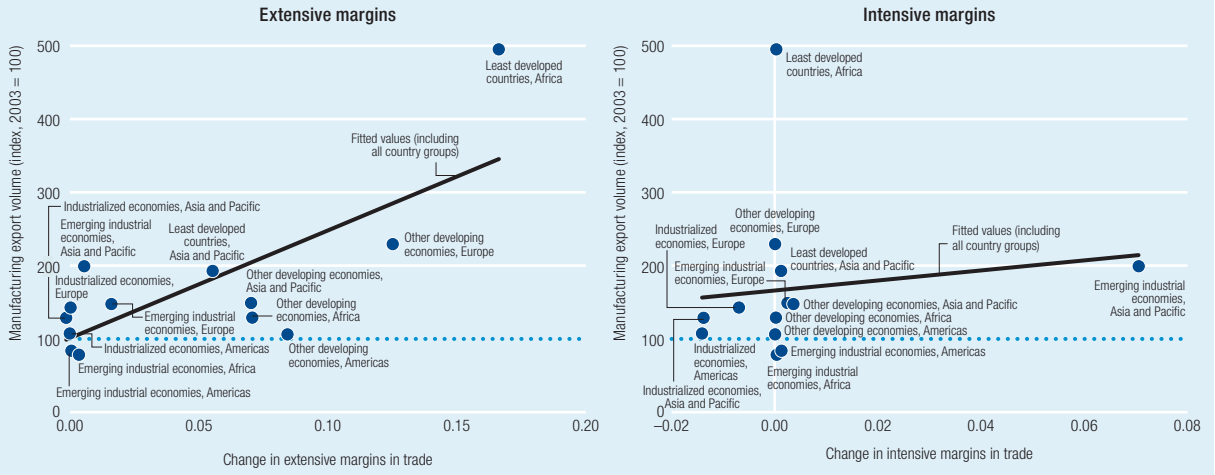
Volumes and changes in the intensive and extensive margins of manufacturing exports

As countries get richer, their exports diversify (Cadot et al. 2011, Imbs and Wacziarg 2003), because economies typically expand their share in world markets by extending the range of products they export. Studies typically decompose cross-country export variations into extensive and intensive margins and study the contribution of these margins to export growth. The extensive margin reflects variation in the number of new varieties a country exports or in the number of new markets (destinations) to which it exports active product lines. The intensive margin reflects variation in export values within existing varieties (typically the average world market share in exports a country obtains). To drive export growth, countries tend to rely on the two margins simultaneously, that is, they take advantage of global demand for new varieties as well as demand for existing varieties. However, the relative weight of the two components differs across country groups and according to a country's level of development.

Export volumes positively correlate with changes in extensive margins (Figure 4.7, left panel).[8] The LDCs in Africa and other developing economies in Europe are the country groups where the extensive margin drove changes in exported quantities the most. These countries started out from relatively

“Evidence tends to support the importance of monopolistic competition rather than the specialization perspective put forward by traditional trade theory

Figure 4.7
Manufacturing export volume and changes in the extensive and intensive margins in manufacturing exports



Note: All values are for the period 2003–2014 and in constant 2003 PPP$ (PPP is purchasing power parity). Regional and industrialization level classifications are based on, respectively, Annex C1, Tables C1.1 and C1.2.
Source: UNIDO elaboration based on BACI International Trade Database (Gaulier and Zignago 2010).

low extensive margins. The higher the level of development, the lower the importance of changes in the extensive margin in trade for the expansion of export volumes, as apparent from the experience of industrialized and emerging industrial economies. Countries in these groups are typically already active in a large number of export lines.

Intensive margins (average world market shares in exports) and export quantities also correlate positively but rather weakly across country groups (Figure 4.7, right panel). Increases in the intensive margin were particularly significant for the emerging industrial economies in Asia and Pacific, where they matched equally significant expansions of export volumes in 2003–2014. Over the same period, the industrialized economies lost market shares and experienced a slower growth in export volumes. The extensive margin was the prime driver of the expansion of export volumes for LDCs and other developing economies between 2003 and 2014. This evidence tends to support theories emphasizing the importance of monopolistic competition rather than the specialization perspective put forward by traditional trade theory.

Manufacturing terms of trade and technological sophistication and upgrading

Technical change and innovation are means to offset decreases in the terms of trade over time (Acemoglu and Ventura 2002). Sutton and Trefler (2016) present a process of economic development in which countries first climb the quality ladder in products exported by both developing and developed countries and then diversify into technologically more sophisticated products, which typically only countries with higher income levels export. Only if countries consistently fail in this process should the purchasing power of their exports persistently worsen.

Two indicators can be used to capture this process, one reflecting technological upgrading as a result of changes in the composition of the export basket of a country, the other reflecting technological upgrading in active product lines. Technological upgrading as a result of changes in the composition of the export basket is captured by changes in the product complexity of the exports of a country group relative to all other country groups.[9] Technological upgrading (or vertical differentiation) in active product lines is captured by changes in the share of exports in the highest unit

“Technical change and innovation are means to offset decreases in manufacturing terms of trade over time…

value segment by one country group over a period relative to all other country groups.[10]

Increases in the average product complexity of the products exported by a country group correlate positively with changes in the MBTT in 2003–2014 for LDCs and emerging industrial economies (Figure 4.8, left panel, black regression line). This relation breaks down if the industrialized economies are included in the calculation, however. Industrialized economies went through a very specific type of development, characterized by a strong change in the composition of their export baskets towards more complex products and by a moderate decline in their MBTT.

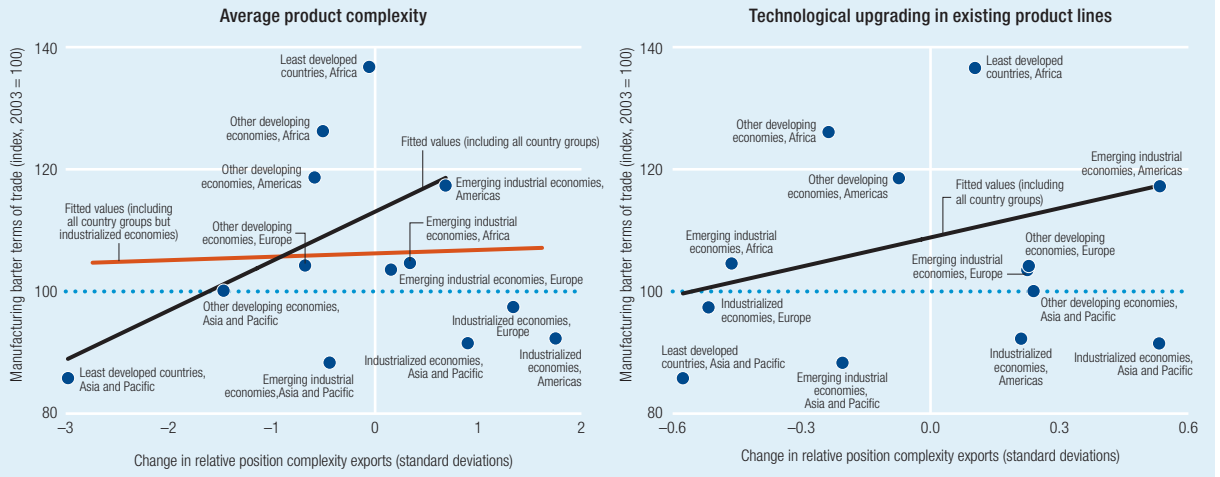
Technological upgrading in active product lines (as reflected in increases of export shares in the top unit-value segments relative to other countries or country groups) also correlates positively with improvement of the MBTT (Figure 4.8, right panel), with considerable variation across country groups. Industrialized economies in Europe and emerging industrial economies and LDCs in Asia and Pacific experienced a relative decline in their export shares in the top unit-value segment. For LDCs in Africa, the emerging industrial economies in the Americas and Europe and the other developing economies in Europe and Asia and Pacific, the reverse is true. The industrialized economies in the Americas and Asia and Pacific increased their export shares in top unit-value segments but also experienced a moderate decline in their MBTT. In the emerging industrial economies and other developing economies of Africa and other developing economies in the Americas, a decline in the top unit-value segment of export shares was accompanied by an improvement in their MBTT.

The evidence thus lends support to the view that technological upgrading is a vital means to avoid persistent declines in the terms of trade and sustain domestic income generation (examples include the stellar performances of some East Asian economies, described in Box 4.1). The relationship is very heterogeneous across countries, however, suggesting that there is no standard approach to influencing changes to manufacturing terms of trade through technological upgrading.

Development and impact of manufacturing export prices

This section examines changes to manufacturing export unit values and their impact on economic growth.[11] Unit values are the ratio of the export

Figure 4.8
Technological upgrading offsets decreasing manufacturing terms of trade over time



Note: All values are for the period 2003–2014. Manufacturing barter terms of trade in constant 2003 PPP$ (PPP is purchasing power parity). GDP is gross domestic product. The complexity of exports is calculated according to Hidalgo and Hausmann (2009). The vertical axis in both panels presents the average changes in manufacturing barter terms of trade in each country group. Regional and industrialization level classifications are based on, respectively, Annex C1, Tables C1.1 and C1.2.
Source: UNIDO elaboration based on BACI International Trade Database (Gaulier and Zignago 2010).

“…but there is no standard approach to influencing changes through technological upgrading

Box 4.1
The Republic of Korea’s race to the top: Shifting from quantity to quality, goods and education

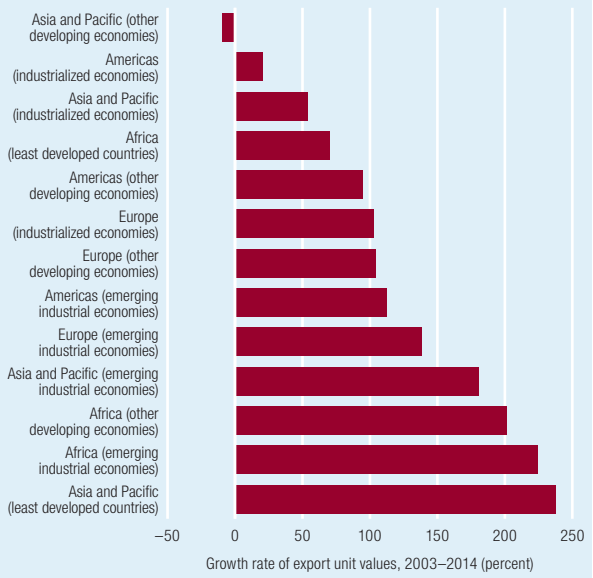
In the 1950s, the Republic of Korea was a low-income country. Today it is one of the principal industrial powerhouses of Asia, having grown at an average rate of 7 percent a year for 50 years.

A major feature of the development strategy was to first raise domestic incomes through exports by selling low-quality, low-priced products, in order to increase presence on international markets. The economy later improved its international purchasing power through extensive investments in technology and human capital, which helped lift the technological content of its exports, and with it, export prices.

Kim (2001) shows how the economy of the Republic of Korea moved from a phase in which its industries merely duplicated the products more advanced countries exported to a phase in which it engaged in a process of creative imitation. In the early imitative stage, raising the general level of education was particularly important. It made it possible for the Republic of Korea to understand technology templates acquired through foreign technology transfer. In the second phase, more formal technology transfer from abroad, corporate research and development (R&D), universities and public research institutes became the crucial sources for augmenting the knowledge base.

In response to competitive pressures from the export market to increase their productivity, domestic firms started generating (and globalizing) new technologies themselves, fostering basic research in universities, mission-oriented applied research in public research institutes, corporate R&D and recruiting key personnel from abroad. These efforts became the most important sources of knowledge.

Figure 4.9
Growth in manufacturing export unit values



Note: All values for the period 2003–2014 and in current $. Regional and industrialization level classifications are based on, respectively, Annex C1, Tables C1.1 and C1.2.
Source: Foster-McGregor et al. (2017b) based on BACI International Trade Database (Gaulier and Zignago 2010) and The Trade Unit Values Database (Berthou and Emlinger 2011).

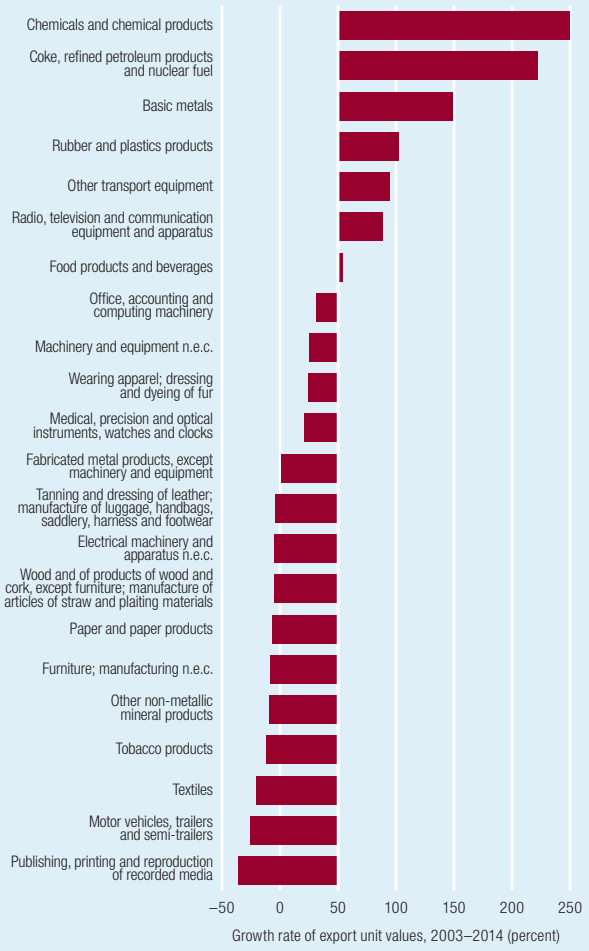
value of a product to its weight. They are commonly used as a proxy for export prices.[12] The focus lies on export unit values, which are a key determinant of the MBTT. Changes in export unit values can be driven, among other factors, by changes in variety—the export of entirely new, and potentially more expensive products, as well as changes in the composition of existing export baskets—and price changes within existing product lines.

In 2003–2014 export unit values increased in all country groups except one (Figure 4.9).[13] Growth was particularly steep in LDCs and emerging industrial economies in the Asia and Pacific region and in emerging industrial economies and other developing economies in Africa. Apart from emerging industrial economies in Africa, the growth rate of import unit values for these four country groups was low, implying fairly large gains in the manufacturing terms of trade. Emerging industrial economies in Europe and in the Americas and other developing economies in Europe saw increases in export unit values of more than 100 percent.

Relative to the average for manufacturing, export unit value shifts were unevenly distributed by industry (Figure 4.10). Chemicals showed the highest increases in unit values. A few of the other sectors with strong rates are closely related to mining (downstream industries following the pattern of increases in the unit values of primary commodities) (Foster-McGregor et al. 2017b). Among the four sectors with the smallest increase in export unit values, three have low technology intensity (according to the technology

"Learning effects related to production technology and consumer needs gradually accumulate as countries export specific products

Figure 4.10
Growth in unit values of exports by ISIC two-digit sector relative to all manufactured goods



Note: All values for the period 2003–2014 and in current $. The bars reflect sector-specific deviations from the overall growth trend in unit values for total manufacturing in the period. Industry group classification is based on Annex C2, Table C2.1. ISIC is International Standard Industrial Classification and n.e.c. is not elsewhere classified.
Source: Foster-McGregor et al. (2017b) based on BACI International Trade Database (Gaulier and Zignago 2010) and The Trade Unit Values Database (Berthou and Emlinger 2011).

classification of the Organisation for Economic Co-operation and Development [OECD]).[14]

The evidence reveals differences across regions (with increases strongest in Africa and in Asia and Pacific) and across country development groups (with increases in emerging industrial economies). It also highlights wide heterogeneity by region and industry. Industries with higher technology intensity and industries related to specific raw materials saw higher increases, but the evidence is mixed (because analysis at this level of aggregation does not allow one to consider vertical price differentiation within an industry).

To what extent are export unit-value increases associated with changes in the variety of exports, or price changes in established product lines through quality improvements? The results discussed in the next subsection show that, although both factors matter, improvements in export unit values are more strongly driven by increases in the unit values of exports in existing product lines; the composition or variety of exports is much less important. This hints at the importance of learning effects related to production technology, consumer needs and so forth (learning through exporting), which gradually accumulate as countries export specific products. New varieties tend to play a greater role in the development of export unit values in LDCs—particularly in Africa and in Asia and Pacific—an outcome that probably partly reflects the limited initial variety of exports in these countries.

What is the impact of rising export unit values in manufacturing on economic growth? The results presented below confirm that improvements in manufacturing unit values have a significant impact on GDP per capita growth, especially for LDCs and other developing economies, with a tendency to have a weakly negative effect in the short run, as expected. These results imply that "commodification"—persistently declining export prices in manufacturing as industrial production remains concentrated in inferior goods—is likely to have a negative impact on GDP per capita growth.

Drivers of change in the prices of manufacturing exports

Several factors drive the evolution of exports' unit values, notably changes in the prices of goods already exported; changes in the composition of the basket of goods already exported; additions to the export basket; and removals from the export (or import) basket.[15] The following analysis is carried out for export unit values in current $, which increased for all manufacturing sectors between 2003 and 2014.

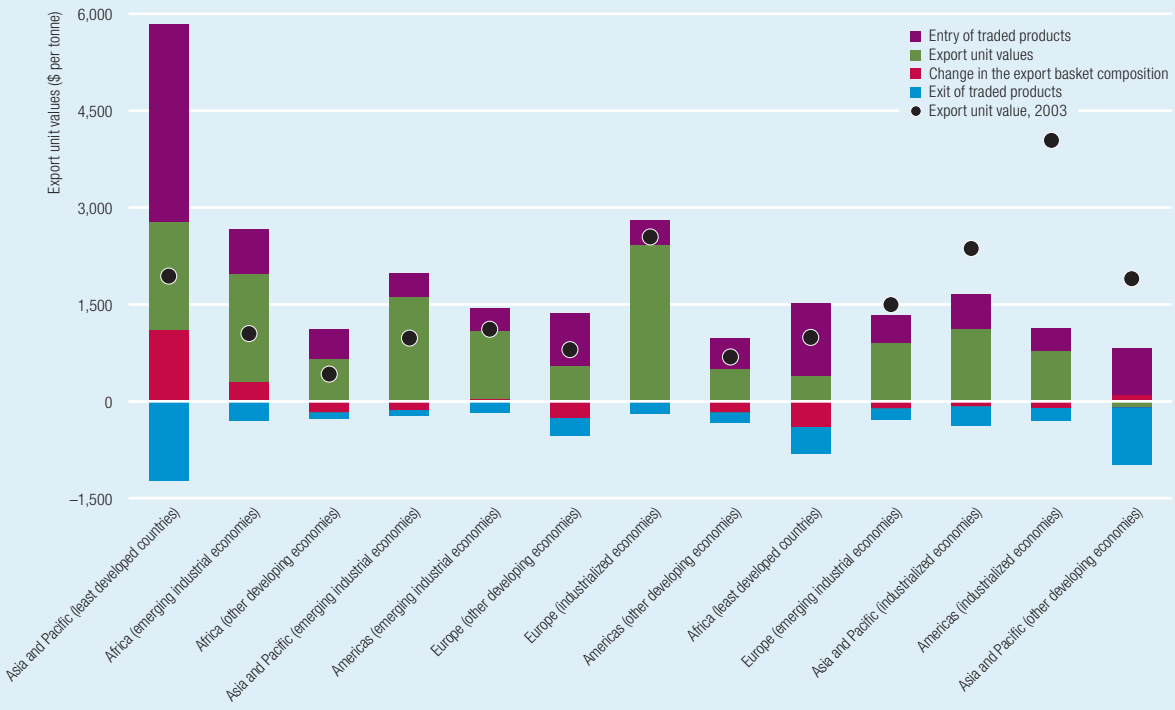
“‘Commodification’ is likely to have a negative impact on GDP per capita growth

For all manufactured goods and across all country groups, the initial (2003) values of the export unit value are largely in line with expectations, with the highest values in the industrialized economies group and the lowest in developing Africa and the Americas (Figure 4.11). Somewhat surprising are the relatively high initial values for other developing economies in Asia and Pacific. These are largely driven by resource based exports by some of the countries in West and Central Asia. Positive shifts took place for all groups except other developing economies in Asia and Pacific, for which a small decline was observed (see Figure 4.9). The largest percentage changes (over 200 percent) are observed in LDCs in Asia and Pacific and other developing economies in Africa. In terms of the decomposition, the two groups look quite different, however.

In other developing economies in Africa, the main factor was a changing unit value of existing exports, with relatively small changes in composition and the role of product entry and exit. LDCs in Asia and Pacific saw a fairly large degree of exit and entry, and a large change in the composition of exports (but not in the change in export unit values of existing varieties). For most other country groups, a changing unit value of exports was the main driver of export unit-value changes (most notably industrialized and emerging industrial economies in Europe, the Americas, and Asia and Pacific). Exceptions to this general pattern are other developing economies in Europe and LDCs in Africa, for which the entry of new varieties was the main driver.

Other developing economies in Asia and Pacific showed a decline in export unit values, driven by the entry and exit of products, with very little change in the composition and unit value of existing exports. This pattern suggests movement out of higher towards lower unit-value products.

Figure 4.11
Country groups show wide differences in the drivers of manufacturing export price changes



Note: All values for the period 2003–2014 and in current $. The diamonds show the 2003 unit value of exports for each of the country groups. The bars show the changes in each of the four terms of the decomposition of the total change in the unit value of exports in the period. Regional and industrialization level classifications are based on, respectively, Annex C1, Tables C1.1 and C1.2.
Source: Foster-McGregor et al. (2017b) based on BACI International Trade Database (Gaulier and Zignago 2010) and The Trade Unit Values Database (Berthou and Emlinger 2011).

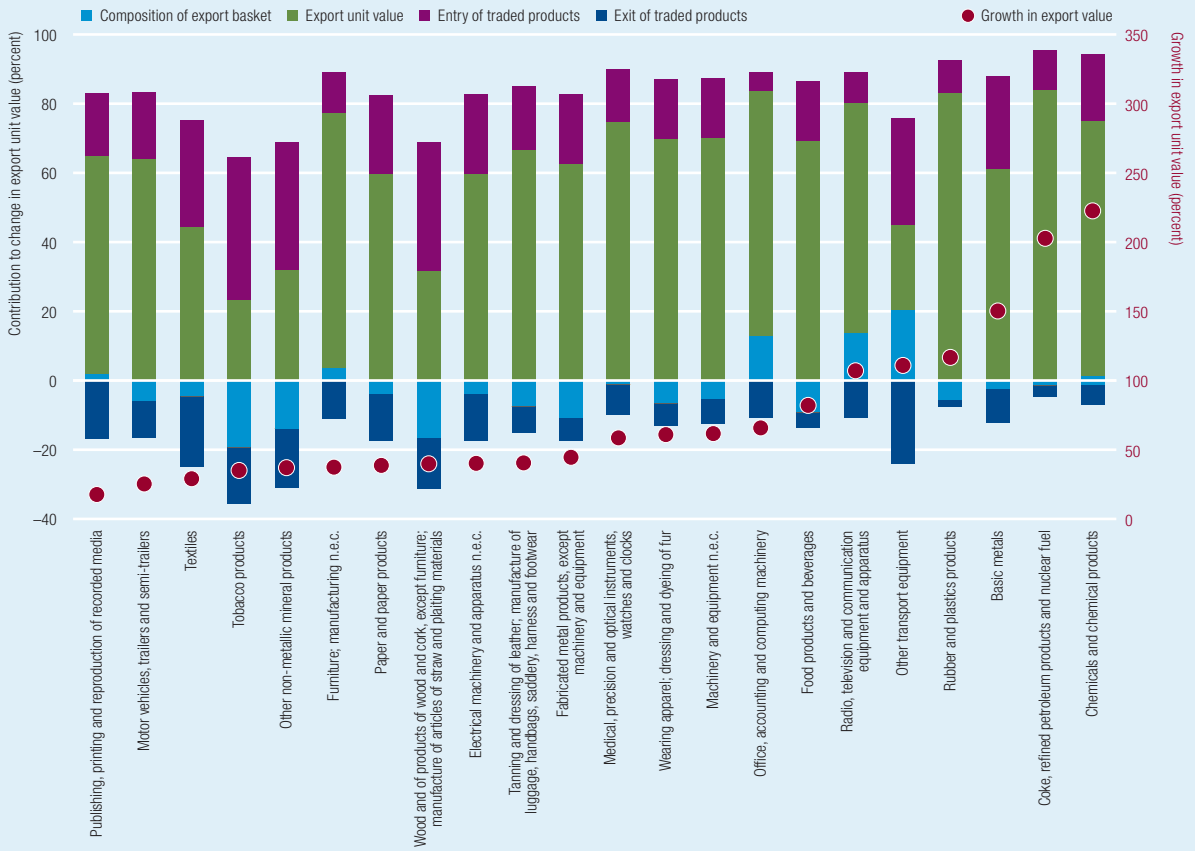
“Globally, changes in the unit values of existing varieties accounted for much of the increase in export unit values across sectors

Globally, changes in the unit values of existing varieties accounted for much of the increase in export unit values across sectors (Figure 4.12).

Changes in the unit values of existing varieties tended to be larger in sectors that saw the strongest growth in export unit values (except for other transport equipment). For some sectors at the lower end in terms of unit value growth (particularly textiles, tobacco and wood), a changing unit value of existing exports played a more minor role. The role of new varieties differed widely across sectors. It was more important for textiles, tobacco, non-metallic minerals, wood and other transport and less important for rubber and plastics; coke, petrol and nuclear fuel; and office and computing machinery. For most sectors, the change in the composition of existing exports had a negative effect on the change in the unit value. The negative effects of product exit tended to be larger for sectors that witnessed the smallest growth in unit values.

To summarize, the results of the decomposition show that increases in the unit values of existing exports usually drive improvements in manufacturing export unit values; the impact of changes in their composition is much smaller. The entry of new varieties tends to be more important for changes to export unit values in the LDCs—particularly in Africa and in Asia and Pacific—an outcome that probably partly reflects the limited initial variety of exports there.[16]

Figure 4.12
The drivers of manufacturing export price changes differ by industry



Note: All values for the period 2003–2014 and in current $. Industry group classification is based on Annex C2, Table C2.1. N.e.c. is not elsewhere classified.
Source: Foster-McGregor et al. (2017b) based on BACI International Trade Database (Gaulier and Zignago 2010) and The Trade Unit Values Database (Berthou and Emlinger 2011).

"An increase in manufacturing export unit values has a positive and significant effect on GDP per capita growth, in the long run

Impact of changes in manufacturing export unit values on economic growth

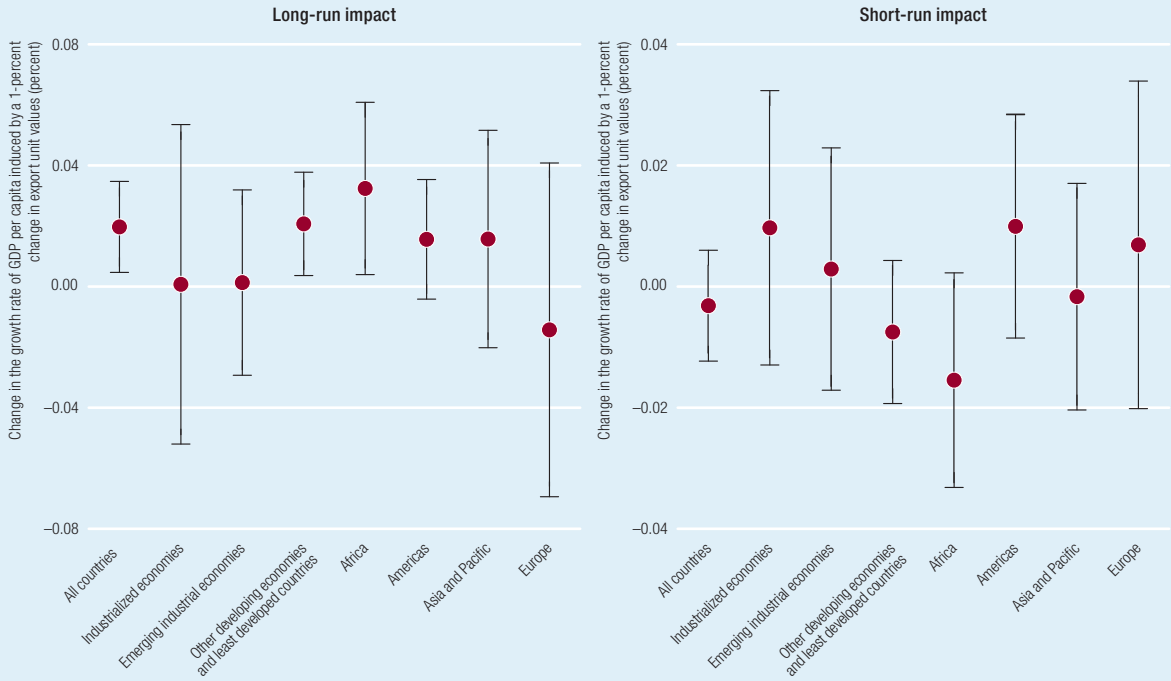
An increase in manufacturing unit values has a positive and significant effect on GDP per capita growth, in the long run and across all countries and sectors: Foster-McGregor et al. (2017a) show that a 1 percentage point gain in unit values induces an acceleration of GDP per capita growth of about 0.02 percentage points (Figure 4.13, left panel).[17] This effect is more notable for LDCs and other developing economies; regionally, it is stronger in Africa, Asia and Pacific and the Americas. For all other groupings, the effects are not significant.

Across all countries, the short-run impact of export unit values is not significant for manufacturing.[18] The results suggest a weakly negative impact of manufacturing prices on per capita GDP growth in the short run (Figure 4.13, right panel). Short-run effects are significantly negative for LDCs and other developing economies, as well as in Africa and Asia and Pacific. Short-run effects are insignificant but positive for industrial and emerging industrial economies as well as countries in Europe and the Americas.[19,20]

The risk of commodification in manufacturing exports

The evidence presented in this section so far indicates that unit values in manufacturing in current money terms steadily increased across regions and industrial sectors. At first blush, this finding seems to contradict a key assumption of the modified Prebisch-Singer hypothesis—namely, that developing countries run the risk of falling into a commodity trap if they specialize in manufacturing products with low technological content in production and low quality standards, persistently failing to upgrade their exports

Figure 4.13
Higher prices of manufacturing exports accelerate economic growth, mainly in the long run



Note: The figure presents the elasticity of the growth rate of GDP (gross domestic product) per capita induced by changes in manufacturing unit values: The dots represent the point estimates and the lines the 95 percent confidence interval of the respective estimates. Manufacturing exports is of all goods, which refer to consumer goods, intermediate goods and capital goods together. Regional and industrialization level classifications are based on, respectively, Annex C1, Tables C1.1 and C1.2.
Source: UNIDO elaboration based on estimates by Foster-McGregor et al. (2017b) derived from BACI International Trade Database (Gaulier and Zignago 2010) and The Trade Unit Values Database (Berthou and Emlinger 2011).

"Countries that comply with the destination market's regulatory standards are better able to escape commodity traps

technologically. However, the high level of aggregation of the data may mask commodification processes at more disaggregated levels for certain export product lines and for trade flows to specific destinations.

Analysing bilateral trade flows, Ghodsi and Stehrer (2017) show that both commodification and quality upgrading processes can be observed at the level of disaggregated bilateral trade flows.[21] Their analysis indicates that persistent declines in export prices of dominant products in a sector have a negative impact on bilateral MBTT, whereas commodification processes on the import side improve bilateral MBTT significantly.[22]

Moreover higher export specialization tends to improve bilateral MBTT, an outcome likely to reflect the positive impact of learning through exporting on export prices, albeit probably with a large trade-off: Increased export diversity (i.e., export revenues that are spread more evenly over active product lines) within a sector tends to reduce the negative impact of commodification of exports on MBTT at the sector level (Ghodsi and Stehrer 2017). From a policy point of view, it is therefore important to strike a balance between focusing on export activities and ensuring diversification of the export portfolio.

Ghodsi and Stehrer (2017) also find that qualitative non-tariff measures such as technical barriers to trade and sanitary and phytosanitary measures tend to mitigate the negative impact of commodification on MBTT of a given sector if imposed against exports. This finding suggests that countries that comply with the destination market's regulatory standards, which are objectively intended to increase the quality of products and production procedures, are better able to escape commodity traps.

In a trade environment that is increasingly driven by technical regulations and quality standards, therefore, compliance—in quality, certification and labelling—is important not only to ensure or retain market access, but also to increase a country's competitiveness (Box 4.2). From a policy perspective, it is important to maximize adherence to trade standards—through,

Box 4.2
Increasing product quality in Colombia's cosmetic sector

A country's export destination matters. Exporting to high-income destinations where a more sophisticated and diversified demand exists, for instance, can contribute towards improving a country's export prices. Consider, for instance, the cosmetics sector. In industrialized economies, consumers' preferences appear to be increasingly shifting towards goods produced using natural ingredients. In this context, the market potential for natural cosmetics exports is significantly enhanced.

Yet increasing one's export share within advanced economy markets requires that exporting firms comply with national and international regulations and standards, as stipulated, for instance, by the WTO *Agreement on the Application of Sanitary and Phytosanitary Measures.* Countries must establish efficient certification and accreditation procedures in order to gain market access. Proving compliance with quality standards by establishing an adequate quality infrastructure is therefore essential to take advantage of a rapidly diversifying global demand. Moreover, standardization can also contribute to ensure consumer protection more broadly at the national level.

Colombia's cosmetics sector is a case in point. The country is a regional leader in the production of cosmetic products—ranging from make-up, hair- and skin care products to items for personal cleaning—derived from natural ingredients, such as vegetable oils, extracts and essential oils. While the cosmetics industry has advanced in its consolidation at the regional level, it is yet to take advantage of its full export capacity. Managing the quality of local natural ingredients is key to achieving this goal. Based on Colombia´s great biodiversity, natural cosmetics can not only position the country as a source of quality products, they also can make industrial development more inclusive by integrating local producers of ingredients and small enterprises within the global value chain.

Since 2014, UNIDO has worked with Colombia's Ministry of Industry, Commerce and Tourism to address quality related gaps and strengthen conformity with international standards in the country's cosmetics value chain. To this end, the *Cosmetic Sector Quality Programme* aims to strengthen the capabilities of Colombia's national quality system. It reinforces the country's quality infrastructure, including testing, inspection, calibration and certification services. And it supports key players within the value chain—from growers to processors and exporters—to implement more stringent international quality, private and sustainability standards.

> **Market size and sophistication of both domestic and foreign markets have a significant impact on manufacturing unit values**

say, investing in infrastructure, reforming institutional and administrative structures and upgrading production processes along value chains, particularly in agro-industries (UNIDO 2015c).

Impact of global demand characteristics on manufacturing export prices

From a supply-side perspective, improvements in manufacturing export unit values (and their positive impact on domestic income) typically reflect innovation. This section takes a demand-side perspective, focusing on the role of market and demand characteristics of foreign and domestic demand in the evolution of manufacturing terms of trade.

Market size and related scale economies are major determinants of trade specialization and trade flows (Krugman 1980). If scale effects are important for production, companies that can benefit from them will prefer locating in larger markets, where a large part of their products will be consumed and exported, lowering the domestic price level. This "home market effect" will affect trade flows and lower export unit values.

The gravity approach to international trade —as followed to a degree by Bykova et al. (2017)—postulates that a good produced in any country will be exported to all other countries in proportion to the purchasing country's GDP. Large destination markets are therefore likely to augment domestic scale effects. Hence, both domestic and destination market size should lower export unit values.

Feenstra and Romalis (2014) stress that per capita income and the level of development induce more sophisticated preferences and higher demand for quality. In manufactured products, demand for domestic products from higher-income countries will therefore concern more sophisticated goods or unique varieties from domestic production that command higher prices. Therefore, all else equal, for any level of domestic income, an increase of exports to high-income destinations should lead to an improvement in the manufacturing terms of trade. Higher domestic income (measured by real GDP per capita) gives rise to a more sophisticated and differentiated demand at home, creating opportunities for both horizontal and vertical domestic product differentiation. Controlling for export volumes, higher-quality or new products command higher prices at given export volumes. Hence, increases in domestic GDP per capita should also improve export unit values. Finally, controlling for home market and product differentiation effects, increases in international demand for domestic products should have a positive effect on unit values by way of simple demand shifts, which for given levels of factor inputs will increase export prices.

Drawing on Bykova et al. (2017), this section explores the impact of global demand and demand characteristics on bilateral unit values at industry level. It focuses on the impact on the unit value ratio of exports of a few indicators capturing the market size and demand sophistication of trading partners and international demand for domestic products. The unit value ratio is defined as the ratio of the unit value of a product realized by an exporting country to a specific destination to the average unit value of all its imports from the world. Market size is proxied by real GDP per capita. The results were obtained through econometric estimations controlling for several features of both the exporting and importing country affecting bilateral trade flows.

Bykova et al. (2017) lend some support to the hypothesis that market size and sophistication of both domestic and foreign markets have a significant impact on manufacturing unit values. All else constant, economies of scale and increasing returns to scale reduce manufacturing unit values and help countries penetrate new markets through terms-of-trade effects. All else constant, the income level of the exporting and importing countries increases manufacturing unit values, as more sophisticated and differentiated products targeting specific consumer preferences command higher prices. This higher income level increases the purchasing power of exports and domestic wealth. To paraphrase the title of a seminal paper by Hausmann et al. (2007), it is not only *what* you export that matters for economic development but also *where* you export to.

> **“It is not only what you export that matters for economic development but also where you export to**

Bykova et al. (2017) find that a change of real GDP in both the importing and exporting country negatively correlates with the unit value ratio (Figure 4.14). A 1 percent change in real GDP in the importing country has a particularly strong impact on LDCs and on low-tech sectors, with changes of 0.7 and 0.5 percent, respectively, (panels b and d in Figure 4.14). A 1 percent change in real GDP of the exporting country (panel a) has a strong effect on the unit value ratio in emerging industrial and other developing economies. The effect on the unit values of high-tech sectors is statistically not significant; for intermediate products it is close to zero.

The level of real GDP per capita (panels c and d) has a positive and significant effect on the unit value ratio and thus on export unit values in manufacturing for the pooled sample (all goods) and all other subgroups shown in the figure. The effect of a change in GDP per capita of the importing country is particularly strong for LDCs and low-tech sectors, presenting essentially the inverse picture of what is seen for the impact of real GDP of the importing country on the unit value ratio. The effect of domestic GDP per capita changes on the unit value ratios is particularly strong for emerging industrial economies and other developing economies, for medium-high and medium-low tech sectors and for capital goods.

The effect of changes in global demand for domestic products is positive—about a 0.05–0.2 percent increase in the unit value ratio for a 1 percent increase of export values to a specific destination (Figure 4.15). Global demand for domestic products is captured by bilateral export values. Only for medium-high technology is the effect insignificant. The observed effect for capital goods is also relatively small, which is consistent with the observation for the medium-high tech sector, which also includes the machinery and equipment industries.

Policies to promote export-driven industrial development

Capturing incomes from global demand for manufacturing is an important determinant of economic development. Such demand from developing countries has increased. The manufacturing income terms of trade (which captures the international purchasing power of exports) also improved across country groups, growing more rapidly in country groups with higher growth in per capita income. The most significant gains were in country groups with the highest cumulative growth rates in 2003–2014.

The beneficial effects of an industrialization strategy geared towards global demand depend on how countries adjust their terms of trade. If they consistently fail to upgrade their manufacturing export portfolios, they run the risk of seeing their terms of trade deteriorate as a result of commodification. They can counter the impact by augmenting the technological content of exports and upgrading the quality of exports.

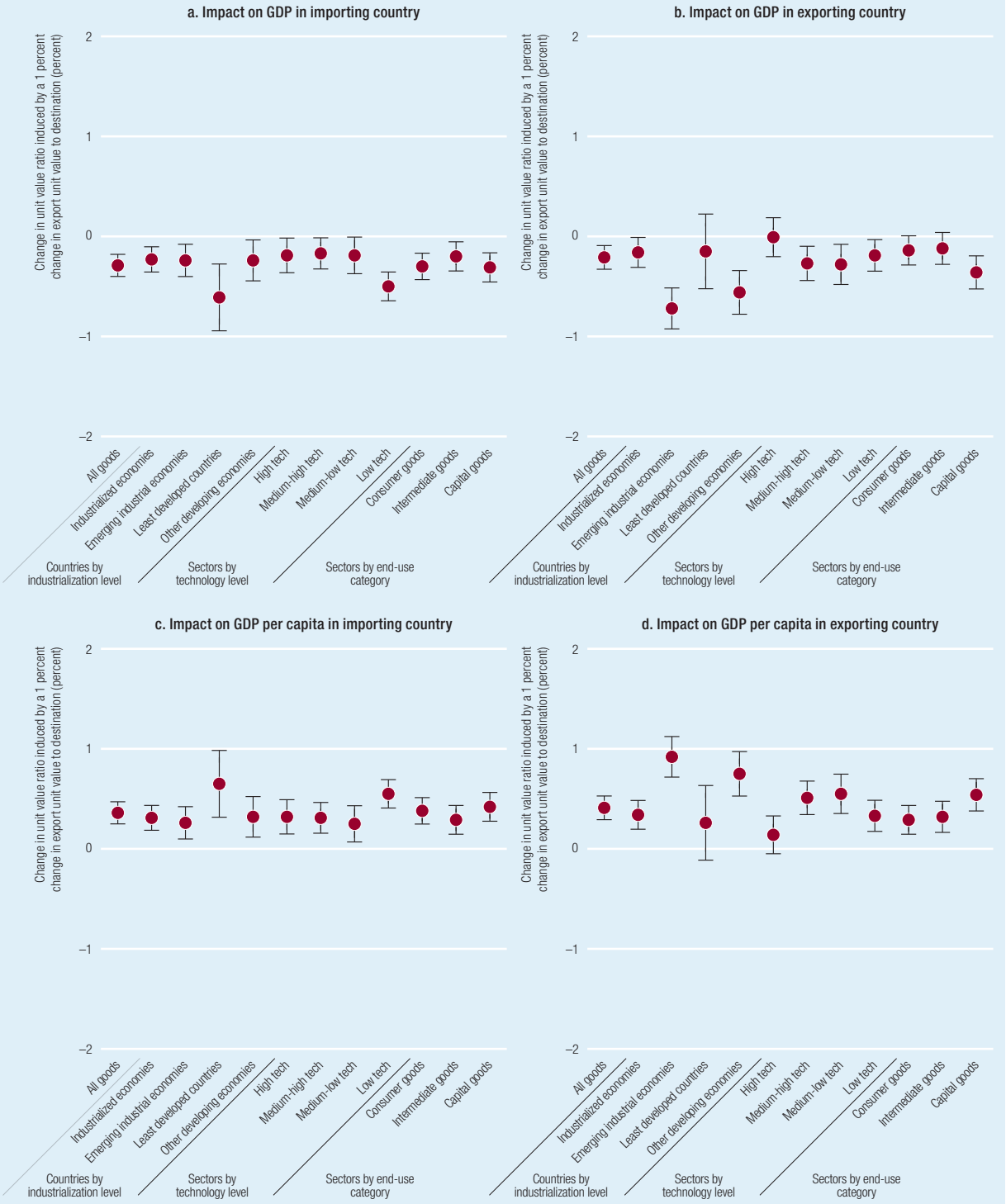
Gains in manufacturing terms of trade are driven mainly by product upgrading within established export lines, which hints at the presence of learning effects as countries accumulate experience through export activities. Product upgrading also has a positive impact on domestic incomes.

Upgrading—either in existing or new product lines—also helps make industrialization truly inclusive. As discussed in Chapter 2, from a global perspective whether or not the circle leads to inclusive outcomes largely depends on the extent, as well as the modality in which countries participate in international trade. When countries remain trapped in labour-intensive, low-tech segments—or are left out altogether—the income generation potential of the circle is severely limited.

Among demand-side factors, exporting to larger markets supports economies of scale and increased returns to scale, which provide room for reducing export prices and further expanding export volumes —both important factors for penetrating new markets through terms-of-trade effects. Exporting to destinations with higher incomes and more sophisticated demand also tends to support increases in export price, with a positive effect on the purchasing power of exports and on domestic wealth. Hence, for countries

“Economies of scale and increasing returns to scale reduce manufacturing unit values and help countries penetrate new markets through terms-of-trade effects

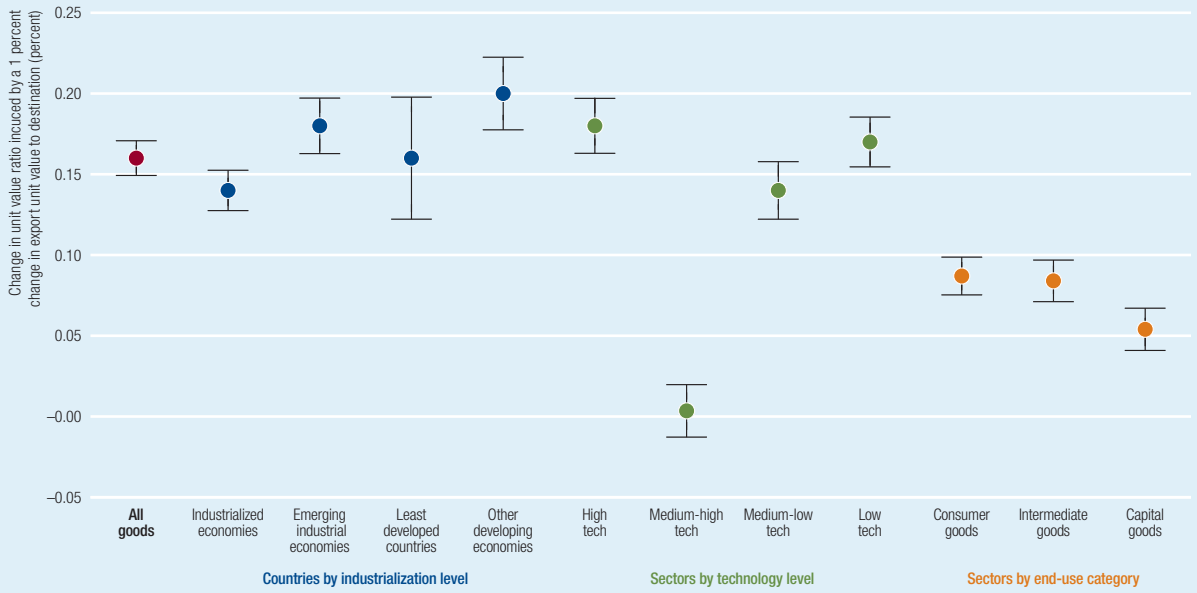
Figure 4.14
Where you export to matters: Impact of market size and income level of trading partners on unit value ratios



Note: All values for the period 2003–2014 and in current $. The figure presents the elasticity of the growth rate of gross domestic product (GDP) per capita induced by changes in manufacturing unit values: The dots represent the point estimates and the lines the 95 percent confidence interval of the respective estimates. All goods refer to consumer goods, intermediate goods and capital goods together (for more details please see UNSD n.d. c). Industrialization level and technology classifications are based on, respectively, Annex C1, Table C1.2 and Annex C3, Table C3.2.
Source: UNIDO elaboration based on estimates by Bykova et al. (2017) derived from BACI International Trade Database (Gaulier and Zignago 2010) and The Trade Unit Values Database (Berthou and Emlinger 2011).

“A stronger focus on specific destinations in a sector can facilitate upgrading processes and improve the manufacturing barter terms of trade

Figure 4.15
Unit value ratios improve with higher global demand for domestic products



Note: All values for the period 2003–2014 and in current $. See note in Figure 4.14.
Source: UNIDO elaboration based on estimates by Bykova et al. (2017) derived from BACI International Trade Database (Gaulier and Zignago 2010) and The Trade Unit Values Database (Berthou and Emlinger 2011).

pursuing an export-led growth strategy in manufacturing, it is important to target larger markets with lower prices first before later focusing on high-income markets with more sophisticated, higher-priced products.

A stronger focus on specific destinations in a sector can facilitate upgrading processes and improve the manufacturing barter terms of trade. Diversification strategies may help mitigate the negative effect of export commodification. Countries complying with product or process regulatory standards in leading export markets are also better able to avoid persistent declines in manufacturing export prices.

Implications

Policy-makers can promote export-driven industrialization by encouraging upgrading and innovation (on the supply side) and stimulating the choice of some types of export destination over others (on the demand side). Countries that fail to exploit these opportunities risk moving into a downward spiral of declining terms of trade and competitiveness that neutralizes any positive effect from industrialization (Box 4.3).

Box 4.3
Avoiding premature deindustrialization

Export-driven development policies have produced very different results. In Asia they have led to sustained economic growth. In Africa and Latin America, they have not.

In line with work by McMillan and Rodrik (2011), McMillan et al. (2017) find that the differences reflect differences in the reallocation of labour from agriculture to other activities. Countries where industrialization policies led only to slow economic growth tended to reallocate labour from agriculture to low-productivity activities in services. In contrast, countries experiencing fast growth moved labour to high-productivity activities in manufacturing.

The authors refer to the first of these two phenomena as “premature” deindustrialization, a concept first introduced by Palma (2008). They suggest that a combination of classical industrial policies (such as subsidies to manufacturing) and structural policies targeting the business environment, education and the rule of law are needed. Rapid industrialization through classical export-oriented industrialization policies without structural policies will at best lead to episodic growth, according to the authors, and structural polices without a proactive policy towards export-led industrialization will lead to slow growth.

"Policy-makers can promote export-driven industrialization by encouraging innovation and stimulating the choice of some export destinations over others

Export-led industrialization occurs in two phases. In the first, low export prices can drive market entry and the expansion of manufacturing exports. At this stage, classical industrial policies are crucial to start and deepen the process. To avoid adverse effects on manufacturing terms of trade, the technological sophistication and quality of these exports need to gradually improve in the second phase, as countries shift their export destinations towards higher income markets. In this crucial phase, support to firms to meet quality standards in high-income countries and related trade-facilitation activities may be extremely useful, aligned with structural policies in education, training, the business environment and conditions for private entrepreneurship.

Two pointers for industrial policies emerge. The first concerns the reasons why countries fail to redirect labour from agriculture to manufacturing. The second concerns the balance needed to achieve diversification and specialization. On both issues the literature provides no definitive answers—nor can it. Policy-makers must recognize that the development of a country's productive structures is a highly cumulative, path-dependent process and that structural change is necessarily rooted in the current knowledge base, in industrial specialization and in diversification, with multiple implications for industrial and structural policies:

- If the export success of one product is intrinsically related to the ease with which factors move between economic activities, the benefits of diversification can be reaped only if factor substitution mechanisms operate properly. Structural policies supporting the mobility of labour and the removal of obstacles related to investment and capital circulation are critical.
- It is not possible to develop internationally competitive products out of the blue. Unique specializations are key drivers of the development of comparative advantage and international competitiveness. New exports must be rooted in the existing competence base, and complementary factors and competencies must be built. Modern industrial policies should therefore consider how the current competence base can be used to develop related areas in which the country does not yet have a competitive advantage.
- Industrial diversification is likely to be successful if a competence base for new economic activities is gradually built to the point where a critical mass is reached. Policies aiming at strengthening the competitiveness of countries should therefore assess existing productive structures as well as the knowledge base and take these competencies as a starting point.
- Export destinations should be carefully selected. This is an area where government can play a critical role, for example, as a provider of market intelligence (see Chapter 6).
- In the long run, diversification beyond local capabilities and comparative advantage is a key driver of economic growth (Lin and Chang 2009, Saviotti and Frenken 2008). To defy the forces of comparative advantage, huge investments in education and research are needed (Mehta and Felipe 2014). It is thus important to strike a balance between structural policies (promoting diversification beyond existing comparative advantages) and more traditional industrial policies (promoting export-driven industrialization based on comparative advantages and capabilities in related domains) (McMillan et al. 2017).
- If there is no or very little opportunity and the local competence base is unrelated or very distant to sectors with the potential to generate income and employment, countries may get trapped in inferior productive structures if the strategy focuses too narrowly on the existing competence base (Jankowska et al. 2012). One way to minimize the necessary competency build-up is to assess how much the current competence base enables the economy to join international value chains and to develop know-how necessary for just one of several production stages or production tasks (Baldwin 2006). Another is to assess whether complementary investments to make certain economic activities possible are needed and carry out up- and downstream investments.

> **"Support to firms to meet quality standards in high-income countries and related trade-facilitation activities may be extremely useful**

- Industrialization strategies should not be designed and executed top down; they should enable "entrepreneurial discovery" (Rodrik 2004). The development of new economic activities is a discovery process in which entrepreneurs explore economic opportunities.

These insights and the evidence in this and earlier chapters yield some general principles for policy-makers, which are further elaborated in Chapter 6:

- Review potential markets for domestic products and their potential feedback on domestic industrialization efforts. Countries should enter large unsaturated markets first, only later entering high-income markets with more sophisticated demand.
- Expand export volumes through diversification and upgrading of products in existing markets. Doing so requires constant improvement of the business environment, smoothly operating factor markets and the provision of education and training.
- Consider the feedback of changes to domestic incomes on the domestic industrial base. Higher incomes may favour more variety in domestic manufacturing.
- Use the forces of specialization and comparative advantage to drive diversification and structural change, and identify and act on needs to existing competence and knowledge bases.
- Conduct in-depth analysis of the current strengths and weaknesses of the domestic manufacturing sector, its capabilities, its links to other sector and ways to reallocate production factors from low- to high-productivity activities.
- Acknowledge the interplay between industrial specialization and diversification beyond existing comparative advantages. The complementarity and timing of policies promoting the exploitation of existing capabilities and promoting structural change are key elements in long-run success, with the latter particularly crucial.

Notes

1. The terms "global demand," "foreign demand" and "external demand" are used interchangeably throughout the report to refer to the demand that takes place outside the domestic economy.
2. See Prebisch (1950) and Singer (1950). Baffes and Etienne (2016), Grilli and Yang (1988), Harvey et al. (2010), Ocampo and Parra Lancourt (2006), Sapsford (1985), Spraos (1980) and Thirwall and Bergevin (1985) provide qualified empirical support for the long-run deterioration in the terms of trade of commodity-exporting developing countries.
3. Foster-McGregor et al. (2017b) provide a more nuanced finding. They show that for non-energy commodities, rising export prices can have a positive impact on economic growth but that the prices for these commodities follow cyclical patterns in the medium and long run, with the current cycle pointing down.
4. The share of primary commodity exports and natural resource–based exports from the Americas, the Middle East and North Africa and South Asia has decreased sharply. Sub-Saharan Africa (and LDCs generally) still rely heavily on these types of exports.
5. The total export value of the manufacturing sector was divided by the export price index, and this adjusted figure was divided by the import price index. Both import and export price indexes were calculated as chained Fisher indexes from Harmonized System (HS) six-digit level product data using CEPII's BACI database. The cross-section correlation shown in Figure 4.3 is consistent over time when panel data are used.
6. Changes in the MITT are analysed using an index number with base year in 2003. This index has been constructed combining a quantity index of exports with base year 2003 and the terms

of trade calculated as a ratio of the import and export price indices with the same base year.

7. An index value of 100 indicates that the MITT did not change with respect to the base year; values below and above 100 point to deterioration and improvement, respectively.
8. This indicator was calculated using the decomposition proposed by Hummels and Klenow (2005).
9. The indicator for the complexity of the export basket of countries is based on an indicator developed by Hidalgo and Hausmann (2009). It is a proxy for latent information on the breadth and depth of the knowledge base needed to export a specific basket of products. The indicator was standardized across countries for each year. The indicator values reflect standard deviations from the mean. The indicator thus reflects the relative position of a country group relative to the global mean. A change in this indicator indicates the number of standard deviations by which a country group changed its relative position in the distribution.
10. This indicator was calculated by allocating each bilateral trade flow at the level of six-digit product lines to a specific tercile in the global distribution of unit values in that product line. Its export share in each tercile was then calculated. The aggregate export shares in the top unit value segment were then obtained through weighted aggregation.
11. This section draws on Foster-McGregor et al. (2017a).
12. Unit values are calculated as the ratio between the values (in $) of exports and the volume (in tons). Export shares were taken from the BACI database and a concordance between HS and the International Standard Industrial Classification of All Economic activities (ISIC) from the World Bank (n.d. a) was used to aggregate from the HS six-digit product level to the ISIC two-digit level.
13. Export unit values were calculated in current dollars. It is therefore not surprising that the unit values for all sectors increased. In the section "Increasing the purchasing power of manufacturing exports: Volume, price and variety," price indexes referring to a base year were used. Taking the unit values of the individual sectors relative to aggregate manufacturing allows the sectors that have performed relatively well and relatively poorly (compared with total manufacturing) to be examined (Annex C3, Table C3.2).
14. See (Annex C3, Table C3.2).
15. Feenstra and Romalis (2014) among others consider the notion that the price of the export basket may change due to pure price effects as well as to changes in quality.
16. Foster-McGregor et al. (2017a) decompose export unit values for broad economic categories across regions. Their results largely echo the evidence presented here.
17. The analysis focuses on manufactured goods traded internationally. The capacity to export goods is, however, linked to the productive structure of the economy and to fluctuations in the price of these traded goods, affecting countries' economic possibilities.
18. This is measured in terms of a linear combination for three lags.
19. The insignificant results at the level of country groups likely reflect the systematic differences in value-weighted manufacturing unit values between countries at different levels of economic development (i.e., the fact that there is much variation between country groups but much less within them). Therefore, in the econometric analysis carried out within country groups, differences in manufacturing unit values are a less distinctive factor for economic growth (especially for industrial and emerging industrial economies) than for an analysis between country groups, where differences in manufacturing value are more significant and are therefore identified as an important distinctive factor for economic growth.
20. Foster-McGregor et al. (2017a) also examine the short- and long-run impacts of changes in manufacturing unit value on GDP per capita growth for different product groups along broad economic

categories. These results show a positive and significant long-run effect of manufacturing unit values for consumer and intermediate goods across all countries, but a breakdown by country groups generally tends to deliver insignificant results.

21. Ghodsi and Stehrer (2017) use bilateral trade data at the HS six-digit level to calculate bilateral MBTT at the ISIC Rev. 3 industry level. They measure the commodification of exports as the cumulative decline in the relative price that a country's exporting sector faces in a specific export destination. If, for instance, the textile sector in Bangladesh exporting to Germany experiences substantial declines in export unit values over time relative to other textile products that Germany imports from the rest of the world, this indicator will be larger, indicating that Bangladeshi textile exports to Germany are undergoing commodification. They measure the commodification of exports as the cumulative decline in the relative price that a country's exporting sector faces in a specific export destination.
22. Ghodsi and Stehrer (2017) show that persistent price increases of exports tend to worsen the bilateral MBTT of other developing economies and LDCs. They interpret this result as an indication of the difficulties these groups of countries face when trying to increase the quality of exports alongside that of imports.

Chapter 5

Moving towards sustainable manufacturing consumption

Demand for manufacturing goods and the environment

A continuous increase in consumer demand improves consumers' welfare (see Chapters 1 and 2). More demand is translated into more production of goods, which stimulates profits and wages and further demand and production.

This virtuous process can harm the environment, however, for three main reasons.

- Growing and sustained demand for products requires the use of non-renewable natural resources. Materials and resources are being consumed at a pace that is not sustainable.
- The production of manufactured goods often requires the burning of carbon, which emits greenhouse gases, which lead to climate change.
- Products need to be disposed of. If policies for recycling or reuse are not adopted and enforced, waste disposal costs will become unbearable.

To maintain sustainable growth, economies need to produce and consume environmental goods more efficiently, generating less waste. A new production paradigm is needed to shift towards renewable energy and reduce the use of natural resources.

This chapter defines environmental goods as goods that meet basic needs or improve the quality of life while minimizing the use of natural resources (including toxic materials) and the emissions of waste and pollutants over the product's life cycle, in order to avoid jeopardizing the quality of life of future generations.[1]

Producers aim to attract consumers sensitive to environmental issues by signalling that their products are "environmental." Some of these goods (such as organic food and electric cars), have significant market shares, but the shares are still small compared with traditional goods.

High prices, gaps in consumer awareness of environmental concerns and biases in purchasing behaviour are huge obstacles to the consumption and production of environmental goods. As long as environmental goods do not complete their transition towards massification, they cannot be produced at the scale needed for the substantial price reductions that can stimulate further production.

Market policies aimed at reducing the price of environmental goods and increasing the prices of conventional goods are tools policy-makers can use to increase the production scale of environmental goods. On the consumption side, policies aimed at increasing consumer awareness of environmental issues and correcting information-related market failures, such as labelling, are key. The market alone will not ensure a sustainable development path. Domestic regulation and international agreements (including agreements compatible with the growth needs of least developed countries) are needed.

The 2030 Agenda for Sustainable Development features important Sustainable Development Goals (SDGs) on the environment: SDG 6 (Ensure access to water and sanitation for all), SDG 7 (Ensure access to affordable, reliable, sustainable and modern energy for all), SDG 12 (Ensuring sustainable consumption and production patterns), SDG 13 (Take urgent action to combat climate change and its impacts), SDG 14 (Conserve and sustainably use the oceans, seas and marine resources) and SDG 15 (Sustainably manage forests, combat desertification, halt and reverse land degradation, halt biodiversity loss). For decades previously, scientists and practitioners perceived growth and environmental protection as rivals, but now growing attention is on ensuring growth while preserving the environment and promoting inclusiveness.

The UNIDO aim of achieving inclusive and sustainable industrial development reflects SDG 9 "Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation."

Promotion of the virtuous circle of manufacturing consumption is fully aligned with meeting SDG 9, via

"In the virtuous circle of sustainable consumption, the massification of manufacturing goods would become less harmful to the environment…

promoting industrialization through demand mechanisms. The challenge is to combine industrialization and the full accomplishment of SDG 9 with environmental protection and the full achievement of the other SDGs. International organizations will play a role in this.

A sustainable virtuous circle of manufacturing consumption

This virtuous circle was the basis for industrial development and welfare gains in many now-rich countries. The creation of new goods satisfying demand and their production at scale are the basis for reducing goods prices, increasing real incomes and stimulating new profits and wages. But raising demand for manufacturing goods stimulates firms to increase their inputs —notably from the environmental angle, fossil-fuel energy and other pollutants. It also encourages households to create waste that needs to be disposed of.

Growing demand for manufacturing goods requires a massive increase in the use of natural resources, but as they are limited, consumption cannot be unlimited. This is not a new concept: Club of Rome economists (Meadows et al. 1972) in the early 1970s highlighted the risks of an industrialization not based on sustainability. They reached two main conclusions.

The first was that within 100 years, with no major change in the physical, economic or social relationships that traditionally governed world development, society would run out of the non-renewable resources on which the industrial base depends. Second, after the authors assumed a doubling of the resource stock and with a model to assume alternative visions based on this new higher level of resources, the collapse would still happen, but this time caused by excessive pollution generated by the increased pace of industrialization (enabled by the greater availability of resources).

Some authors (such as Latouche 2006) argued that the only way to tackle the collapse—whenever it happened—was to halt economic growth through reducing consumption and demand for natural resources. This chapter follows a different approach: The virtuous circle of consumption introduced in previous chapters is adjusted to take into account various mechanisms that contribute in rendering the circle environmentally sustainable (Figure 5.1). This framework implicitly assumes a trajectory of continuous growth fed by sustainable-demand mechanisms.

Variety is nurtured by the creation of new goods, but their production requires an increasing volume of polluting inputs that contribute to climate change. To counteract the negative impacts, countries need to spend part of their income to limit emissions (mitigation) or to adapt to climate change (adaptation) (Nordhaus and Yang 1996). Some studies show that climate change will affect poor countries especially (Moore and Diaz 2015). Globally, the pace of annual growth in gross domestic product (GDP) per capita could drop from 3.2 percent in 2020 to 2.6 percent in 2100. As *Industrial Development Report 2016* (UNIDO 2015b) shows, in this new paradigm firms replace fossil fuels with renewable energy if their prices fall and are fully in a position to use their energy sources efficiently, when profitable. Products obtained by more environment-friendly production processes would represent a new variety of goods.

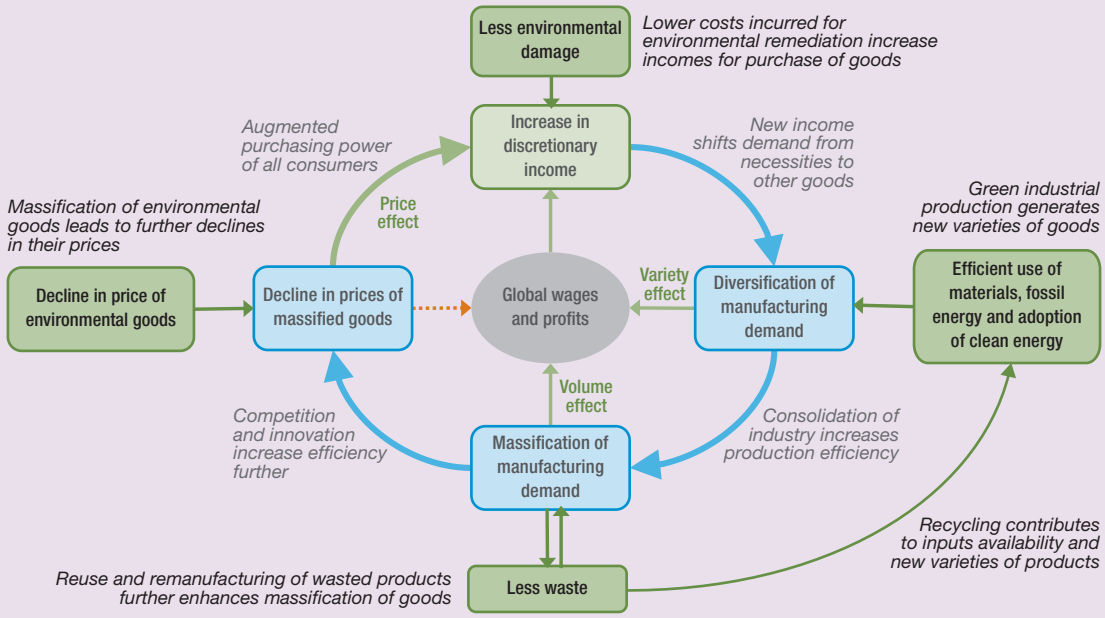
The management of waste is also critical. Traditionally, waste has been considered a "bad." But discussions of the "circular economy" stress that waste has value. The rate of growth in the world market for scrap, for example, exceeds the rate of growth of trade (UNIDO 2015b). Waste has value because treatment allows the recovery of materials that can be reused as inputs or for the remanufacturing of industrial goods.

Massification of environmental goods is accompanied by huge cost reductions. VDMA Photovoltaic Equipment (2016) documents that the learning rate (the proportional drop in cost per unit for a doubling of the installed capacity) for photovoltaic energy is 21.6 percent.

In the virtuous circle of sustainable consumption, the massification of manufacturing goods would become less harmful to the environment because the risk that billions of tons of goods (some hazardous) need to be disposed of is reduced. This would be a new paradigm where production no longer contributes

"...as fossil fuel inputs are gradually replaced with renewable energy; materials and energy are used more efficiently; and final goods are reused or recycled

Figure 5.1
A sustainable virtuous circle of manufacturing consumption



Source: UNIDO elaboration.

hugely to pollution, and its reduction helps to generate income (or forestall losses), because part of GDP is no longer needed to reduce pollution or pay for environmental damage.

In synthesis, the virtuous circle of sustainable consumption is a system in which fossil fuel inputs are gradually replaced with renewable energy; materials and energy are used more efficiently; and final goods are reused or recycled to feed back into the input-generation process. In this system, environmental goods are produced at low prices and largely consumed, whereas "dirty" conventional goods produced with unsustainable production practices are phased out.

The full operationalization of the sustainable virtuous circle of demand would be consistent with the realization of a circular economy (Box 5.1). According to the UNIDO definition of circular economy: "Products are designed for durability, reuse and recyclability, and materials for new products come from old products. As much as possible, everything is reused, remanufactured, recycled back into a raw material, used as a source of energy, or as a last resort, disposed of" (UNIDO 2017a).

Impacts on environmental sustainability

Until recently, indicators did not capture the energy and environmental costs of growth. An indicator created by the World Bank—adjusted net savings —monitors whether depletion of natural capital, such as minerals or forests, is compensated for by investment in other assets, such as human capital or machinery. A positive indicator shows that a country is adding to its overall wealth and that its economic growth is sustainable; a negative indicator means that countries are destroying their wealth. Adjusted net savings are lower than the traditional gross national savings for all country income groups (Figure 5.2). A big gap is in low-income countries, mainly because many of them rely on unprocessed commodity exports, which rely on depletion. Low-income countries often struggle to find the right capabilities, governance, institutional arrangements and

“In a circular economy, resources are used over and over owing to systemic innovations that link products, producers and consumers

Box 5.1
UNIDO and the circular economy

In industrialized and, to a lesser degree, emerging economies, the preferences of businesses and consumers appear to be gradually shifting towards recycling and greater resources efficiency. Yet today's mass production remains, by and large, a linear process. Resources are extracted from the environment, transformed into new products, and then disposed back into the environment after use. This process, as discussed in this Chapter, contributes to the depletion of finite natural resources, as well as to the accumulation of waste and pollution, creating negative environmental consequences.

Against this backdrop governments and other entities, including China and the European Union, are increasingly encouraging the adoption of circular economy principles in order to increase resource efficiency and reduce waste. In a circular economy, resources are used over and over owing to systemic innovations that link products, producers and consumers. The lifespan of products is extended through improved design and servicing: Products are designed for durability, reuse, remanufacture and recyclability. New business models based on connectedness through internet of things, sharing economy and paying for performance propagate circular economy practices among businesses and throughout society. Moreover, waste is relocated from the end of the supply chain to the beginning, so that materials for new products come from old products, consequently closing the loop. As a result, systemic leakages and negative externalities to the environment are minimised.

Economic gains from the circular economy are significant. The Ellen MacArthur Foundation, for instance, estimates that the widespread adoption of circular business models could result in yearly materials cost savings of $1 trillion by 2025 (Ellen MacArthur Foundation 2015). UNIDO is mainstreaming circular economy principles throughout its entire technical cooperation portfolio. The Organization already helps transform industries into contributors to the circular economy in several ways. It supports producers in reducing, or eliminating, pollution and waste; it encourages the use of resource and energy-efficient technologies, as well as renewable energy, in production; and it introduces efficient ways to re-use industrial and biological resources.

One example is *Chemical Leasing,* a business model designed and implemented by UNIDO and the network of National Cleaner Production Centres (NCPCs) since 2004. Chemical Leasing is a pay per performance based model that aims to change the relationships between manufacturers and their suppliers. Under Chemical Leasing, supplier firms lease the chemicals. Suppliers remain owners of the chemical, and are paid for any services—including application, recycling and disposal—provided to firms using the chemicals (Lozano et al. 2014). Chemical Leasing results in increased efficiency in the use of chemicals, minimizing waste that is generated in production.

inputs to transform natural resources into value added. They do not reinvest enough revenues from commodities in human capital, infrastructure and machinery.

Traditional accounting of investment does not capture countries' savings rates, just as GDP does not capture well-being. Stiglitz et al. (2009) conducted one of the most popular analysis of new accounting techniques to measure prosperity. They point out that monetary measures of environmental variables, such as net adjusted savings, are very important but cannot represent the universe of indicators complementing traditional statistics of economic variables such as GDP and investment. The value of many non-market environmental variables cannot yet be precisely and reliably measured simply because they are not priced.

Much progress has been made in estimating non-market environmental assets, however. An example often cited by environmental economists is the recreational value of a lake (Perman et al. 2003). "Contingent valuation" estimates the value people place on such a good by asking them to state their "willingness to pay" to obtain it rather than inferring it from observed behaviour in markets. These techniques are not always reliable, in part because "willingness" estimates depend heavily on respondents' socio-economic status (rich people tend to be more willing to pay for environmental goods than DO poor people).

The world needs ambitious targets for economic development reflecting multidimensional challenges (Hinterberger et al. 2012) but because of these limitations, Stiglitz et al. (2009) suggest focusing on a set of physical indicators. This set is still patchy, which is problematic for implementing and monitoring the SDGs

"The ecological footprint, the atmospheric carbon concentration and the accumulation of rubbish suggest that the world is on an unsustainable path

Figure 5.2
Lowest saving rates at each end of the income curve

Note: All values are for 2015 and in current $. GNI is gross national income. Adjusted net savings is calculated as "gross savings minus consumption of fixed capital, plus education expenditures, minus energy depletion, mineral depletion, net forest depletion, and carbon dioxide and air pollution damage" (World Bank 2017a, p. 234), and gross savings as "gross national income less total consumption, plus net transfers" (World Bank 2016a, p. 237). Income classification is based on World Bank (Atlas methodology, GNI per capita in $) for the calendar year 2015 (see World Bank n.d. b).
Source: UNIDO elaboration based on World Bank (2017a).

Indicators of unsustainability: The ecological footprint, the atmospheric carbon concentration and the accumulation of rubbish

Three indicators—the ecological footprint, the atmospheric carbon concentration and the accumulation of rubbish—suggest that the world is on an unsustainable path, albeit one with a few bright spots.

Using the methodology of Ewing et al. (2010), one can compare the world's ecological footprint and biocapacity. The ecological footprint is "a measure of how much area of biologically productive land and water an individual, population or activity requires to produce all the resources it consumes and to absorb the waste it generates, using prevailing technology and resource management practices." Biocapacity is the ecosystem's "capacity to produce biological materials used by people and to absorb waste material generated by humans, under current management schemes and extraction technologies." The biocapacity index does not incorporate the price of the resources and other economic considerations. It is usually measured in hectares. Since the early 1970s, the world has been consuming more natural resources than the earth is able to produce (Figure 5.3)—an unsustainable path.

This index includes six components: livestock, agriculture, infrastructure, marine resources, deforestation and climate change. Climate change is the most important. Its significance has steadily increased.

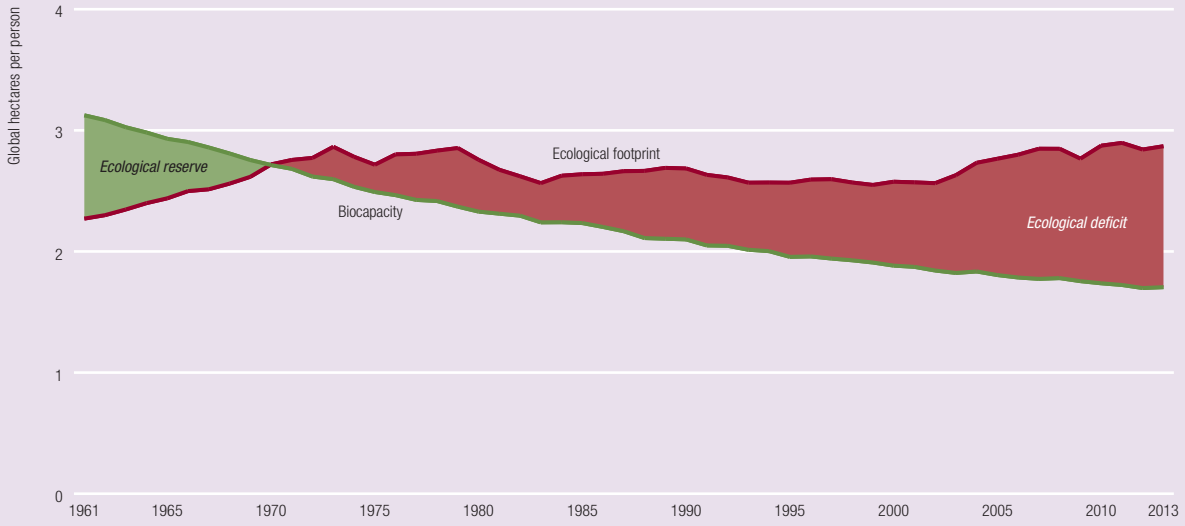
The greenhouse gas atmospheric representative carbon concentration pathways (RCP) of the International Institute for Applied Systems Analysis (IIASA) make clear the uncertainty of projections for climate change emissions (Figure 5.4). The range of possible outcomes is still very broad, but evidence is robust in pointing out that delays in taking actions to tackle it will lead to a heavier bill for mitigation and adaptation (Executive Office of the President of the United States 2014).

An increasing trend is also expected for waste. The world counts 3 billion urban residents producing 1.2 kg per person per day of waste amounting to 1.3 billion tons per year (Hoornweg and Bhada-Tata 2012). The member countries of the Organisation for Economic Co-operation and Development (OECD) are the largest waste generators. Although OECD countries will peak by 2050 and Asia–Pacific countries by 2075, waste will continue to rise in the fast-growing cities of Sub-Saharan Africa (Hoornweg et al. 2013) (Figure 5.5).

Bright spots enlighten this gloomy picture. Unexpectedly, 2015 was the first year when global CO_2 emissions declined after a steady increase over decades (Jackson et al. 2016). Decreased coal use in China and slower global growth in petroleum and faster growth in renewables were responsible for this reduction. In Europe in 2004–2014 waste decreased from 940 to 916 million tonnes.[2] Improvements in physical environmental indicators expressing a more efficient use of inputs and the minimization of negative outputs have a positive impact on the economy because they stimulate production through lower supply costs (lower

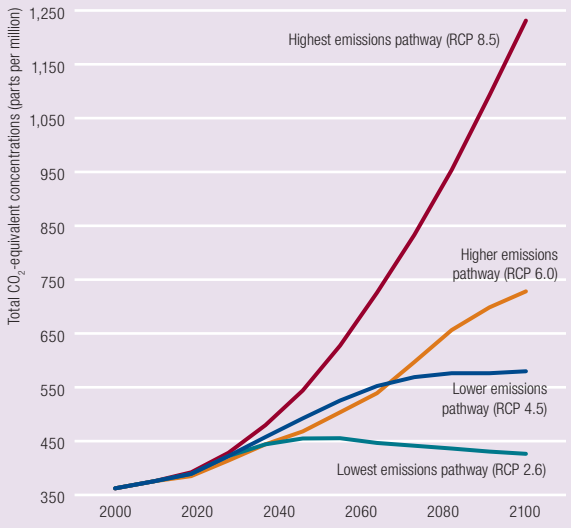
“Global biocapacity went into red nearly half a century ago—but bright spots enlighten this gloomy picture

Figure 5.3
Global biocapacity went into the red nearly half a century ago



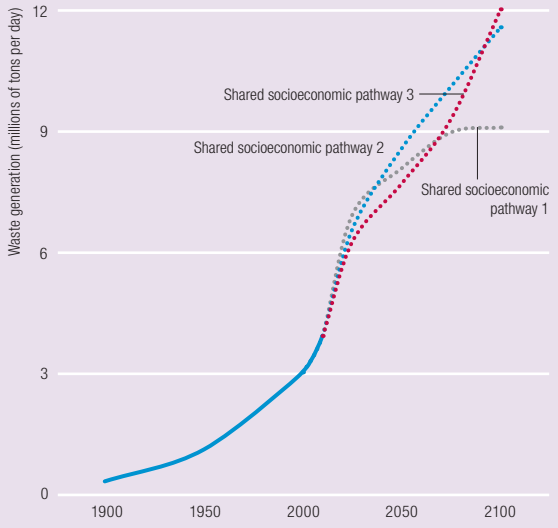
Note: Global Footprint Network refers to global biocapacity as “the ecosystems’ capacity to produce biological materials used by people and to absorb waste material generated by humans, under current management schemes and extraction technologies.” See definition of ecological footprint in the glossary of this report (p. xviii). Read more definitions related to the National Footprint Account at: http://data.footprintnetwork.org.
Source: Global Footprint Network National Footprint Accounts, 2017 Edition (Global Footprint Network 2017a).

Figure 5.4
Higher emission pathways tied to delays in tackling climate change



Note: Each pathway (RPC = Representative Concentration Pathways) has been developed by different modeling teams around the world. RCP 2.6 (Netherlands Environmental Assessment Agency) assumes a mid-century global peak in greenhouse gasses with subsequent substantial reductions. RCP 4.5 (Pacific Northwest National Laboratory’s Joint Global Change Research Institute, United States) and RCP 6.0 (National Institute for Environmental Studies, Japan) are stabilization scenarios that assume utilization of technologies and strategies for lowering greenhouse gas emissions. RCP 8.5 (International Institute for Applies Systems Analysis, Austria) assumes increasing greenhouse gas emissions over time.
Source: Figure by Ilinri (2013) licensed under CC BY 2.0.

Figure 5.5
Global peak waste expected in next century



Note: In the first shared socioeconomic pathway scenario (SSP1), the world’s population of 7 billion people is 90 percent urbanized, development goals are achieved, fossil fuel consumption is reduced and people are more environmentally conscious. In the SSP2 (business-as-usual) forecast, the population is 9.5 billion and the urbanization rate is 80 percent. In SSP3, 70 percent of the world’s 13.5 billion live in cities, there are pockets of extreme poverty and moderate wealth and many countries have rapidly growing populations.
Source: Reprinted by permission from Macmillan Publishers Ltd: Nature. Hoornweg, Bhada-Tata and Kennedy, 502, pp. 615–617. Copyright 2013.

"The scale effect is the most important contributor to emissions and the use of materials, especially in emerging economies

costs to reduce pollution) and through higher demand (part of income can be diverted from pollution control to the purchase of intermediate or final goods). Similarly, the world adjusted net savings indicator has increased since 2008. These are all good signals that something is changing positively, but is not enough to put us on the right path to sustainability, as seen in longer-term trends in the three indicators—and further, in trends in manufacturing processes.

Increased emissions from manufacturing

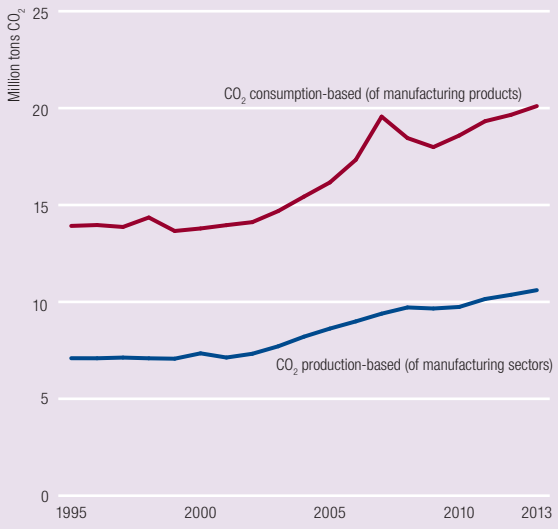
Carbon dioxide emissions and the use of materials in manufacturing increased between 1995 and 2013 (Figure 5.6).

The distinction between production- and consumption-based emissions is important. The former are those of manufacturing production but do not include emissions from other sectors involved in the production process beyond manufacturing. The latter are more reliable in incorporating the genuine carbon footprint of manufacturing goods from a life-cycle perspective (that is, assessing environmental impacts for all stages of a product's life). For manufacturing goods, consumption-based emissions are higher than production-based emissions (see Figure 5.6). From a sustainability perspective, the level of use of materials per capita is higher in 2013 than in 1995 with a risk of depleting current stocks (Figure 5.7).

The trend of emissions and materials consumption can well be understood by using a decomposition approach that investigates the impact of three main components (Figure 5.8): the scale effect (the increase of environmental pressure deriving from increasing value added per capita [for production-based emissions] or final demand of domestic consumption per capita [for consumption-based emissions and use of materials]); the intensity effect (technological change expressing the decrease of environmental pressure per each unit of value added or consumption); and the composition effect (changes in environmental pressure deriving from variations in the sectoral composition of consumption or production patterns).

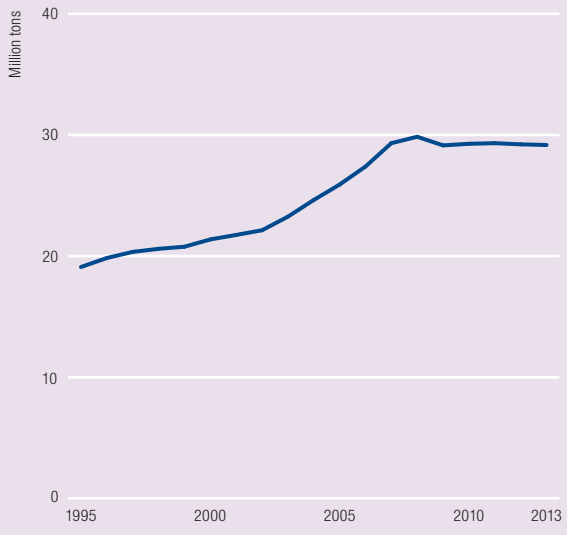
The scale effect is the most important contributor to emissions and the use of materials, especially

Figure 5.6
Consumption-based estimates of global carbon emissions higher than production-based estimates



Note: Manufacturing sector classification is based on Annex C2, Table C2.2.
Source: Mazzanti et al. (2017) elaboration based on the Eora Multi-Region Input-Output database (Lenzen et al. 2012; Lenzen et al. 2013).

Figure 5.7
Global use of materials, 1995–2013



Note: The figure shows the trend in global consumption-based (of manufacturing products) material use. Manufacturing sector classification is based on Annex C2, Table C2.2.
Source: Mazzanti et al. (2017) elaboration based on the Eora Multi-Region Input-Output database (Lenzen et al. 2012; Lenzen et al. 2013).

“Higher levels of GDP per capita tend to reduce the environmental pressure per unit of value added or final domestic consumption…

Figure 5.8
Decomposition of CO_2 emissions per capita growth and materials consumption per capita growth in the manufacturing sector points to scale effects in especially emerging economies

Note: All values are for the period 1995–2013. Industrialization level classification is based on Annex C1, Table C1.2.
Source: Mazzanti et al. (2017) elaboration based on the Eora Multi-Region Input-Output database (Lenzen et al. 2012; Lenzen et al. 2013).

in emerging industrial economies. Least developed countries show a negative scale effect (except in manufacturing materials use) reflecting the weak growth of these countries.

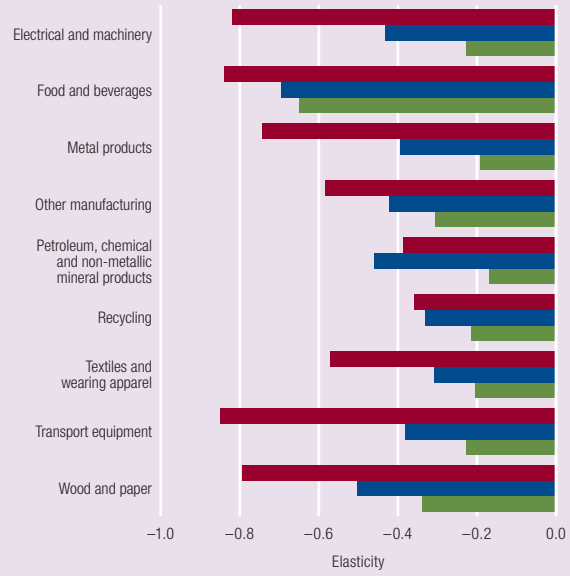
The intensity effect is generally negative. For production-based emissions, the most advanced countries show the biggest (negative) intensity effect, which is consistent with the idea that industrialized economies are better equipped for technological change. For consumption-based emissions and materials use, the intensity effect is much more equal across country groups, which is consistent with the findings of UNIDO's 2016 Industrial Development Report, which noted an increase in globalization and technological diffusion in the past 15 years.

All manufacturing sectors make technological improvements. The elasticity of the environmental pressure intensity (as illustrated in Figure 5.9) to GDP per capita is negative for all manufacturing sectors. This means that at higher levels of GDP per capita countries tend to further reduce the environmental pressure per unit of value added or final domestic consumption. The result is robust across all manufacturing sectors with some heterogeneity in the size of these coefficients by sector and indicator.

For example, the food and beverage sector shows a very large elasticity for production- and consumption-based emissions and materials use. In the electrical section the high elasticity of production-based emissions is not accompanied by high elasticity of consumption-based emissions and materials use. The elasticity of intensity to GDP per capita for materials use is lower than the elasticity for emissions, in part because it is easier to substitute sources of energy than materials. If they wanted to, rich countries could replace fossil fuels with renewable energy to reduce emissions. Replacing materials would be more difficult e.g. there are no substitutes for the more than 200 kilograms of steel and 380 kilograms

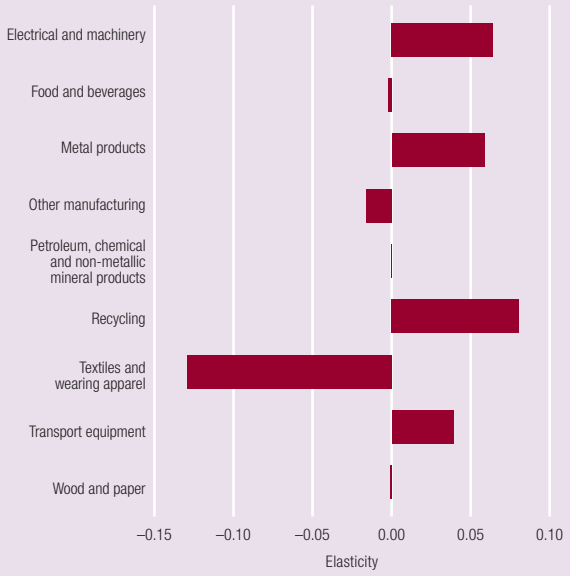
“…and while it may not necessarily lead to waste accumulation it can generate the benefits of the circular economy

Figure 5.9
Elasticity of the environmental pressure intensity to GDP per capita in the manufacturing sector



Note: All values are for the period 1995–2013. Gross domestic product (GDP) per capita is in constant 2005 PPP$ (PPP is purchasing power parity). The figure is based on data for 190 countries in the Eora Multi-Region Input-Output database. See Mazzanti et al. (2017) for technical details on the calculations behind this figure. Manufacturing sector classification is based on Annex C2, Table C2.2.
Source: Mazzanti et al. (2017) elaboration based on the Eora Multi-Region Input-Output database (Lenzen et al. 2012; Lenzen et al. 2013) and World Development Indicators (World Bank 2017b).

Figure 5.10
The economy becomes more circular as GDP per capita increases



Note: All values are for the period 1995–2013 and in constant 2005 PPP$ (PPP is purchasing power parity). GDP is gross domestic product. The figure captures the sector-specific relationship between the share of sector consumption over total consumption in manufacturing goods and the logarithm of GDP per capita (from fixed effect estimates including year dummies). It is based on data for 190 countries in the Eora Multi-Region Input-Output database. See Mazzanti et al. (2017) for technical details on the calculations behind this figure. Manufacturing sector classification is based on Annex C2, Table C2.2.
Source: Mazzanti et al. (2017) elaboration based on the Eora Multi-Region Input-Output database (Lenzen et al. 2012; Lenzen et al. 2013) and World Development Indicators (World Bank 2017b).

of cement produced each year per capita (UNFCCC 2017).

Even for the composition effect there is some heterogeneity. Some sectors, such as electrical and machinery and metal products, show a positive coefficient, whereas others (textile and wearing apparel in particular) have a negative coefficient (Figure 5.10). Some resource-based industries, such as metal products, are characterized by a positive coefficient, meaning that at different stages of development countries tend to intensify industrial activities towards sectors requiring resources. A positive coefficient for the recycling industry may indicate that higher levels of GDP per capita may not necessarily lead to waste accumulation but can generate the benefits of the circular economy (Box 5.2).

Box 5.2
Benefits of the circular economy in India

A circular-economy path to development could bring India annual benefits of $624 billion by 2050 compared with the current development path, or equivalent to 30 percent of India’s current GDP.

In the manufacturing of vehicles designing vehicles for reuse, components for remanufacture and materials for recycling can close loops and reduce upstream demand for materials and energy. Remanufactured parts can be 30–50 percent less expensive while having the same guarantee and quality control as new parts. Remanufacturing a passenger car engine uses only 23 percent of the energy used to produce a new engine from raw materials.

Source: Ellen MacArthur Foundation (2016).

"In 1988–2015 the share of environmental goods in total exports increased in both developed and developing countries

Using environmental goods on the path to sustainability

Monitoring the consumption of environmental goods

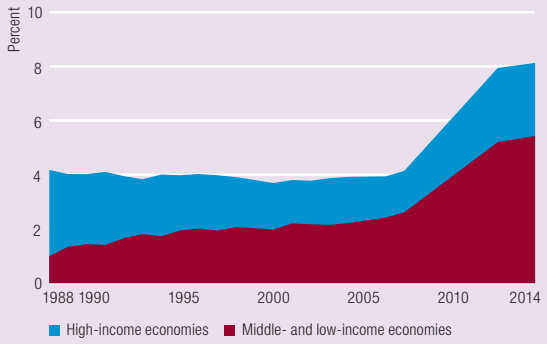
To monitor environmental goods, the OECD list of environmental goods can be used (Steenblik 2005).[3] Its categories of environmental goods can be divided into three groups: pollution management, including items such as catalytic converters or chemical recovery systems; cleaner technologies and products; and resource management, with an emphasis on water supply, renewable energy, and so on. These goods broadly represent products or processes adopted by industries to reduce pollution and final household goods.

In 1988–2015 the share of environmental goods in total exports increased in both developed and developing countries. Environmental goods now represent a relevant market segment but despite a growing trend the share of trade of these goods remained small, up to 8 percent (Cantore and Cheng 2017; see Figure 5.11).[4]

The monitoring of final environmental goods is complicated. In organic farming, for example, produce raised using environment-friendly techniques is recognized as organic only if a farmer chooses to be part of a certification system. Many farmers in low- and middle-income countries lack easy access to international market systems.

Following aggregated consumption trends of all environmental goods is virtually impossible. No internationally recognized dataset tracks all the environment-friendly variants of each product. However, the literature abounds on the attitude of individuals towards final goods, where the environmental attribute is explicitly manifested through certification, labelling or marketing, and can still tell us quite a lot about the diffusion of final environmental goods. Moreover, even if diffusion of environmental goods as an aggregate could be tracked, it would be difficult to analyse to what extent their penetration is sufficient to activate a transition towards a virtuous sustainable circle of demand (see Box 5.3).

Figure 5.11
Export share of intermediate environmental goods on the rise



Note: Environmental goods and income classifications are based on, respectively, Steenblick (2005) and Annex C1, Table C1.3.
Source: UNIDO elaboration based on the United Nations Comtrade database (UNSD 2016a) and World Bank income classification based on Atlas (World Bank 2016b).

Box 5.3
Measurement problems on the impact of environmental goods

The lack of standardized classifications of environmental goods is accompanied by difficulties in tracking the environmental impact of environmental goods because:

- There is not a straightforward way to track if a product is environment-friendly for every environmental indicator. Just as a mere example an energy-efficient refrigerator can still remain problematic in terms of waste disposal or materials use.
- A comprehensive analysis of the impact of environmental goods should incorporate an analysis of the environmental pressure based on a life cycle analysis approach, tracking the environmental impact of all the production process steps. The life cycle analysis could be very complicated in practical terms.
- There may be uncertainty in the environmental impact of environmental goods as ecological processes may be very complex. It would be difficult to analyse to what extent their impact is sufficient to transition towards a sustainable virtuous circle. Uncertainty does not allow calculating exactly the needed environmental improvement to reduce the risk of big damages and disasters.

“People in developing countries are far more concerned about the environmental impact of their consumption than people in high-income countries

Demand for environmental goods in developing countries

The hypothesis of the “environmental Kuznets curve” is that at higher levels of income, consumers tend to reorient consumption towards environmental goods. Despite some evidence that the income elasticity of environmental goods is greater than one (Ghalwash 2008), the issue remains controversial. The hypothesis that environmental quality is a luxury good does not consider that poor people are most directly affected by the quality of environmental resources. And the evidence shows that there is no clear divide between high- and low-income countries towards the environment (Padilla 2017); environmental awareness and the willingness to act in environment-friendly ways are not lower in emerging economies than in industralized ones. According to the Greendex Survey, people in developing countries are far more concerned about the environmental impact of their consumption than people in high-income countries (Figure 5.12).[5] People in developing countries also report feeling guiltier about their impact on the environment than do people in high-income countries (Pontoni and Bruschi 2017).

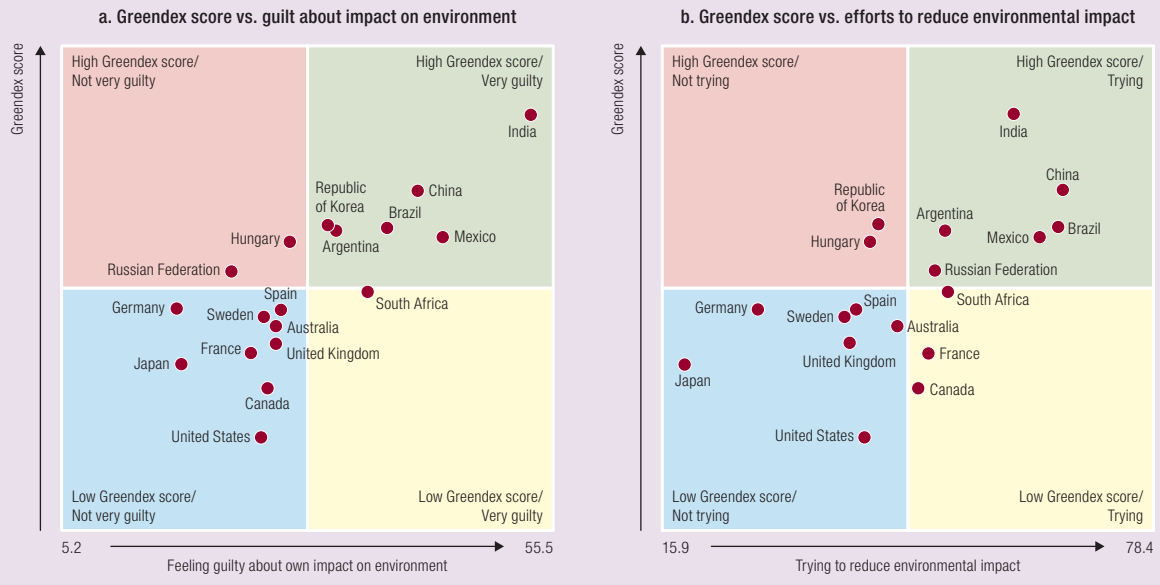
According to a survey by The Nielsen Company (2015), it is harder to convince consumers to buy or pay more for sustainable products in developed markets than in Latin America, Asia, the Middle East and Africa, where consumers are 23–29 percent more willing to pay a premium for sustainable goods than rich countries.

Environmental goods—work in progress towards massification

Many final environmental goods are not fully massified, such as those from organic farming. The definition of organic agriculture by the International Federation of Organic Agriculture Movement fits our concept of environmental goods as it reduces environmental impact in terms of soil, groundwater, climate change and biodiversity (Box 5.4).[6] Some sources report that food has the biggest ecological footprint because of its larger impacts in production and consumption (WBCSD 2008).

The world sales market of organic products rose from $15 billion to $80 billion in 1999–2014, with

Figure 5.12
Consumer attitude: How guilty do you feel about your impact on the environment and do you try to reduce it?



Note: The Greendex 2014 survey examined environmentally sustainable consumption based on the results of online interviews with approximately 1,000 consumers in each of the 18 countries.
Source: National Geographic and GlobeScan (2014).

“Beyond price, the lack of environmental awareness is not the only reason to explain consumer resistance to buying organic products

Box 5.4
Organic products as environmental goods: The environmental impact of organic farming

According to the FAO, organic farming delivers environmental benefits from many points of view.

For the soil, practices such as crop rotation, intercropping, symbiotic associations, cover crops, organic fertilizers and minimum tillage encourage soil fauna and flora, improving soil formation and structure and creating more stable systems.

Pollution of groundwater from conventional agriculture with synthetic fertilizers and pesticides is mitigated by organic agriculture, which replaces synthetic fertilizers and pesticides with organic fertilizers (e.g. compost, animal manure and green manure) and adopts greater biodiversity (species cultivated and permanent vegetation), improving soil structure and water infiltration.

In air and climate change, organic agriculture reduces non-renewable energy use by decreasing the use of chemical fertilizers and pesticides (these require high quantities of fossil fuel to be produced). Organic practices also contribute to mitigating the greenhouse effect and global warming through their ability to sequester carbon in the soil.

Organic farmers promote biodiversity at various levels. At the general level, traditional and adapted seeds and breeds are preferred for their greater resistance to diseases and their resilience to climatic stress. At the species level, diverse combinations of plants and animals optimize nutrient and energy recycling for agricultural production.

Source: FAO (n.d. b).

90 percent in North America and Europe. Retail prices of organic products are normally more expensive than conventional products. As the diffusion of manufacturing goods heavily depends on price and usability of products and on country characteristics, even in many countries in North America and Europe the share of organic sales in total sales never goes beyond 8 percent of total consumption (Figure 5.13). Consumers exposed to the choice of organic certified food compared with conventional food frequently continue to orient their selection towards conventional food because of this price effect, and so price is an impediment as it is too high to attract enough demand to stimulate the transition from market segment to full massification (and the related virtuous circle). The Food and Agriculture Organization (FAO) of the United Nations provides reasons why organic agriculture is more expensive than conventional food, including that organic farming can be less productive than conventional farming (FAO n.d. a, Ponisio et al. 2015).

Beyond price, the lack of environmental awareness is not the only reason to explain consumer resistance to buying organic products. Social, economic and cultural drivers also matter such as ethical values, sense of community or the macroeconomic context (Misra and Singh 2016).

Similar considerations apply to electrical vehicles. Electrical vehicle penetration is very low. According to one recent study (IEA 2016), even if new registrations of electric cars (battery electric and plug-in hybrids) increased by 70 percent from 2014 to 2015, vehicles sold worldwide would still reach only 550,000 in 2015. A few countries such as Norway aside, the market share of electrical vehicles is minuscule (Figure 5.14), because of cost and lack of infrastructure.

These examples show that many environmental goods are taking long to reach the production scale for manufacturing's sustainable virtuous circle. Only if environmental goods were produced on a massive scale like conventional goods will the virtuous circle of manufacturing consumption become sustainable.

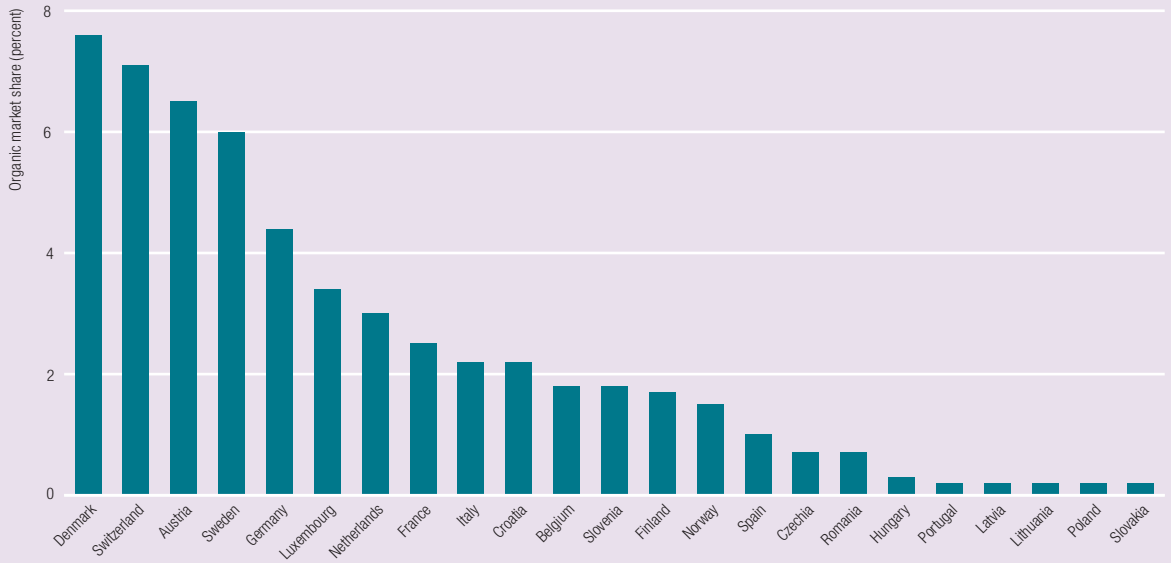
Until 2013, light-emitting diode (LED) lamps represented small market segments characterized by high production costs. Up to 2013 the market share in a set of high-income countries only just reached 15 percent in Australia and is below 5 percent in countries such as the United Kingdom and the Republic of Korea (World Bank 2016a).

The ban of incandescent lamps in the United States and other world countries and the continuous decrease of production costs is stimulating a staggering increase of the LED market share and rapid phase-out of traditional lamps (see Navigant Consulting 2014, Wu 2016).

The technical literature on consumers' purchasing behaviour shows price to be one of the most important deterrents to consumers (Aschemann-Witzel

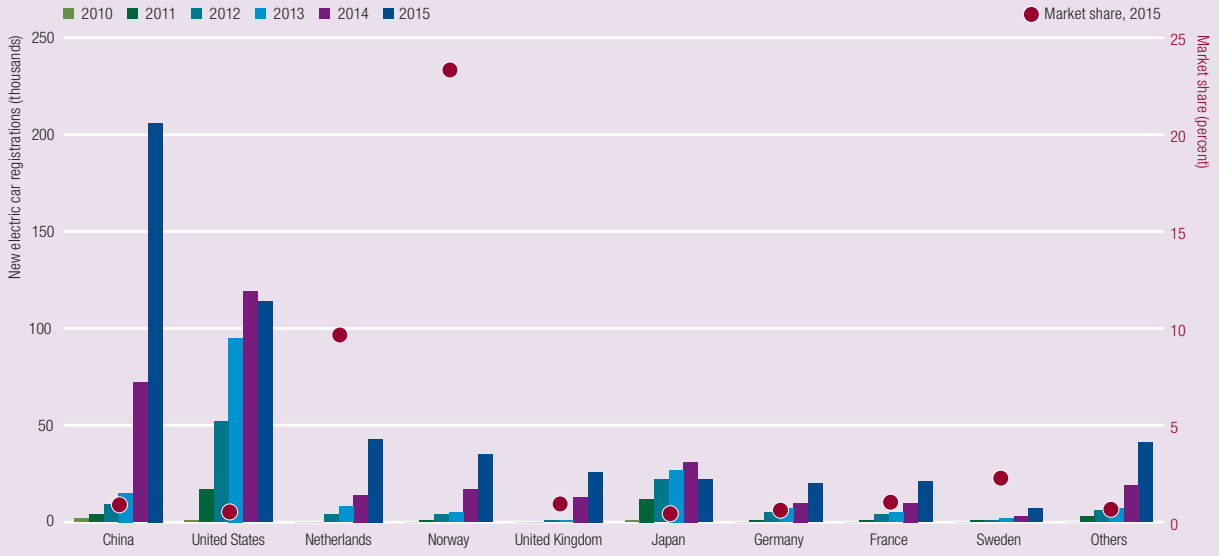
“Organic products and electric cars are still non-massified goods—price is an impediment preventing the transition from market segment to full massification

Figure 5.13
Organic consumption still a market segment in developed nations



Note: All values are for 2015 and are in million $.
Source: Willer and Lernoud (2017).

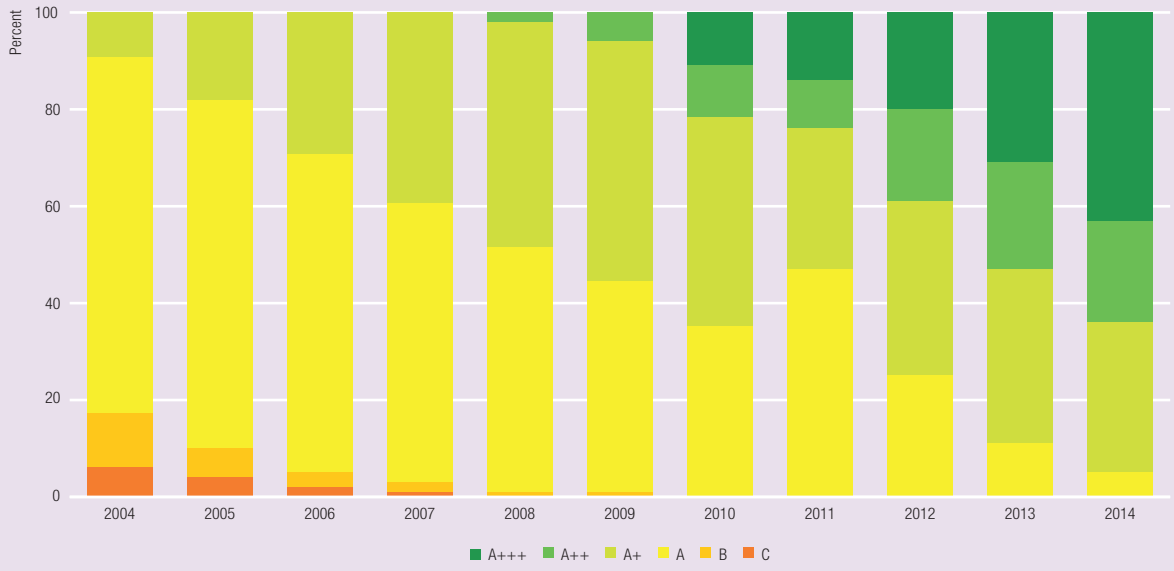
Figure 5.14
Rising demand for electrical cars still to be manifested in market share



Source: © OECD/IEA [2016] Global EV Outlook, IEA Publishing. Licence: www.iea.org/t&c; as modified by UNIDO. Includes data by the European Fuels Observatory, www.eafo.com.

> **“Environmental goods can be palatable even when their price is higher than that of conventional goods**

Figure 5.15
Increasing penetration rate of high-efficiency refrigerators



Note: See endnote 3.
Source: Topten (2015).

et al. 2014). Of course, the price itself is not a standalone factor. LED lights have been more expensive than other options for years, but labels explaining product characteristics—such as longevity—gave consumers the confidence to purchase more efficient LED lamps for the first time (World Bank 2017a). Some consumers might choose LED lamps not for their environmental attributes (such as the smaller impact of greater energy efficiency on the environment) but for a non-environmental benefit (such as longevity).

Another positive picture comes from refrigerators, where the most energy-efficient classes (A+++, A++ and A+) have lifted their penetration of the European Union market (Figure 5.15).

Prices of environmental goods—generally higher

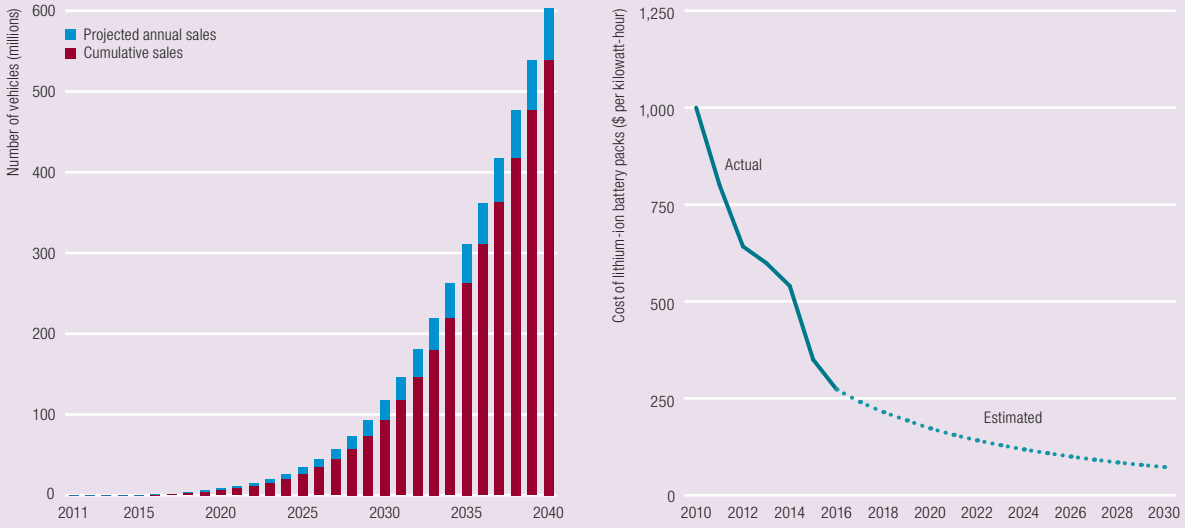
As with organic food, the price of environmental goods is often higher than that of conventional products. The production of environmental goods often requires a different production process, different materials or entails extra marketing costs. When the consumption of goods is price elastic, people tend to orient their preferences towards cheaper goods. In other words, consumers are not always willing to pay a premium for the environmental attribute, which helps explain why environmental goods can take longer to penetrate the market.

As with lamps, the price for many environmental goods is decreasing. For electric vehicles and their batteries (which can make up a third of the vehicle's production cost) their price is coming down and could be set to do so even more dramatically. In 2030 the cost —in 2016 at $273 per kilowatt hour—will drop to less than $100, which could propel annual electric vehicle sales to about 600 million cars in 2040 (Randall 2016).

Environmental goods can be palatable even when their price is higher than that of conventional goods. With refrigerators, class A+++ products are gaining market share even though this category is expensive, no doubt given consumers' expectation of energy savings over the longer term (Figure 5.17). The cost of

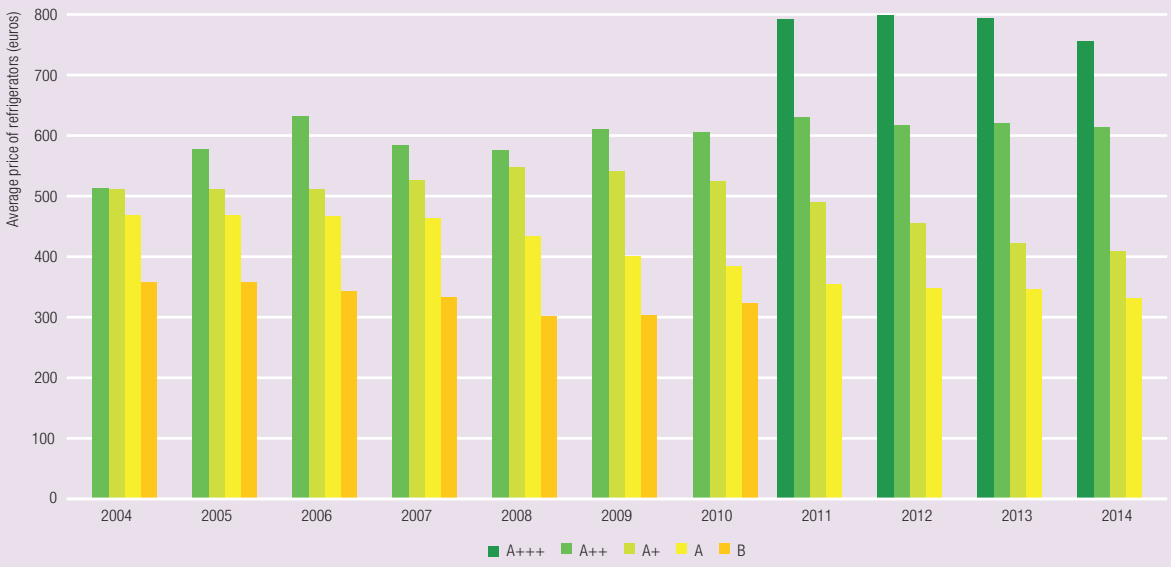
“The cost of goods along the whole life cycle of products is what often attracts consumers

Figure 5.16
Projections of electric vehicles and cost of lithium-ion battery packs



Source: Bloomberg New Energy Finance (2017).

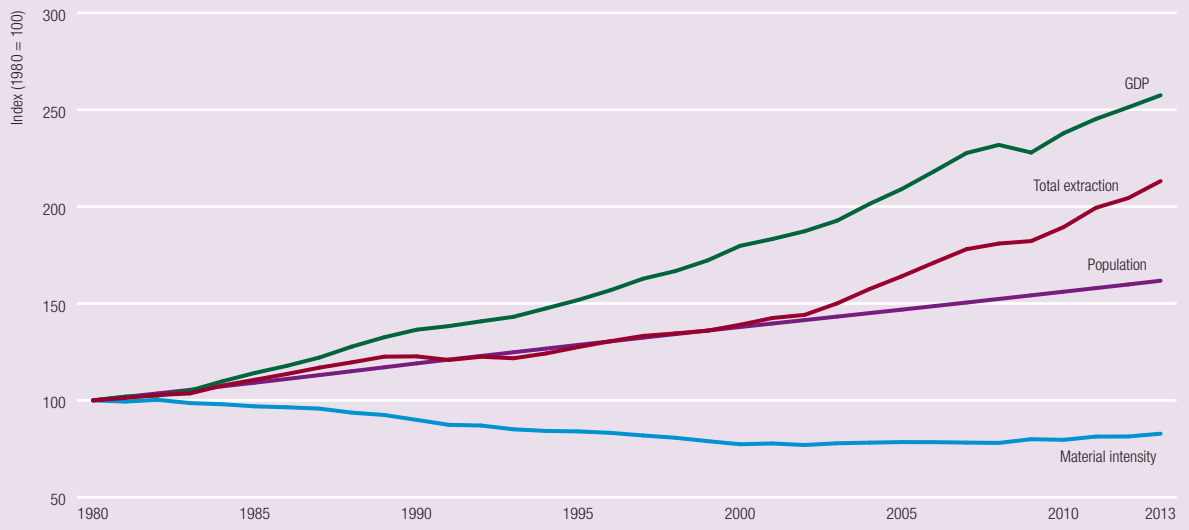
Figure 5.17
Average prices of refrigerators sold in the European Union, 2004–2014



Note: All values are in EUR for energy classes A+++ to B. Regulation also played a major role in the refrigerators market. In 1999 class D, E and F refrigerators were banned by the European Parliament. In 2010 classes less efficient than A were banned. The most recent ban concerns class A refrigerators. Nonetheless, among the classes A+, A++ and A+++, A+++ refrigerators could gain market despite their highest price.
Source: Topten (2015).

“Biases may affect consumer behaviour. Some consumers may remain unconvinced of the need to protect the environment

Figure 5.18
Widening environmental footprint from consumption as wealth rises



Note: GDP is gross domestic product.
Source: Padilla (2017) elaboration based on the Global Material Flow database (WU 2015) and World Development Indicators (World Bank 2017b).

goods along their whole life cycle is what often attracts consumers.

Low prices of environmental goods can sometimes go against sustainability. The production of goods is becoming more efficient because of technology effects (UNIDO 2015b). The Jevons effect states that technological change is good for the environment because it generates efficiency in the use of resources but may also result in a bigger negative effect when lower prices induced by technological change stimulate further resources consumption.

Figure 5.18 shows an increase of technology efficiency (a decreasing material intensity, blue line) in the use of materials accompanied by a growing demand of resources (an increasing total extraction, red line). This provides suggestive—although non-definitive—support for this hypothesis.

Environmental awareness and purchasing behaviour

Consumers considering buying an environmental good go through three stages. First, they become aware of the environmental threat and become keen to help mitigate it through consumption. Second, they acquire the necessary information about the impact of environmental goods on the environment. Third, they buy the good.

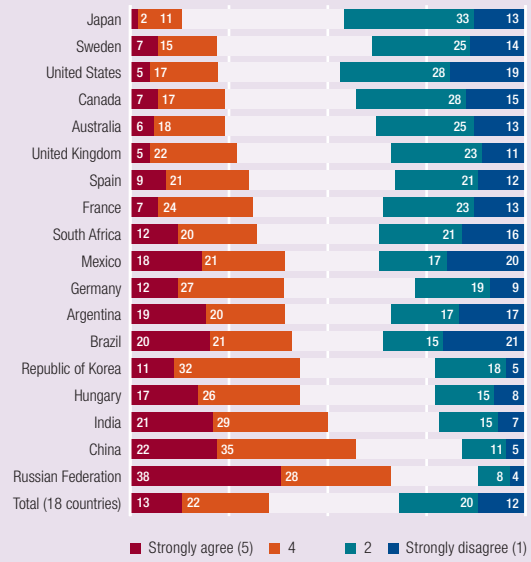
Biases may affect consumer behaviour. Some consumers may remain unconvinced of the need to protect the environment. According to a report by the OECD (2014), more than 40 percent of respondents in Australia, Japan and the Netherlands believe that “environmental impacts are frequently overstated,” and more than 20 percent of respondents in Japan and Spain believe that “environmental issues should primarily be dealt with by future generations.” These consumers are unlikely to buy goods because they have environment-friendly attributes.

Even consumers who are sensitive to environmental issues may not purchase environmental goods. According to a survey by Greendex, large shares of respondents in developed and developing countries are sceptical that consumer behaviour can improve the environment; this view is widespread in large middle-income countries such as China and India (Figure 5.19).

Provided that consumers care about the environment and think that consumption can be an option to

“The lack of trust among producers and consumers represents another market factor that is a key obstacle in marketing environmental goods

Figure 5.19
Consumer attitude: There is very little individuals can do to reverse the impact of society on the environment



Note: The white space represents the portion of respondents who answered “3” (on a scale of 1 to 5), answered “Do not know” or did not answer at all. The Greendex 2014 survey examined environmentally sustainable consumption based on the results of online interviews with approximately 1,000 consumers in each of the 18 countries.
Source: National Geographic and GlobeScan (2014).

help to improve the environment, they need to acquire the necessary information on the environmental goods and on their purchase costs. Consumers need to understand the attributes of products, via information, but are not always in a position to acquire and use it. In the case of energy-efficient refrigerators, crucial information would be to understand the energy savings obtained by buying an environmental product. A study shows that the price premium paid for the highest energy-efficiency label in the refrigerator market of the Basque Autonomous Community in Spain is about €60 (~ $84), or one-third of the value of the “energy savings” gained by consumers (Galarraga et al. 2011).

Labelling and certification are crucial for highlighting the environment-friendly attributes of products. In Spain the gap between consumers’ willingness to pay for energy-efficient refrigerators and their monetary gain from more energy-efficient appliances meant that consumers were not fully aware of the economic benefits of energy-efficient refrigerators (Galarraga et al. 2011). A labelling system would have been more effective if it had contained more information on the monetary gains for consumers. The 2011 Industrial Development Report states that the *Energy Star* international standard for rating energy efficiency of manufacturing products has influenced consumer choice over its 25 years of existence.

Yet appropriate labelling and marketing can also be an enormous vehicle of firms’ profits. A survey by The Nielsen Company (2015) shows that only firms representing 4 percent of total revenues among all brands did not take any steps to advertise environmental attributes through campaigns (the “marketing-only” category) or through explicit claims expressed as labels or other forms of written information on the product package (“claim only,” Figure 5.20). Those firms showed the lowest growth rate of total revenues in 2014 (0.9 percent).

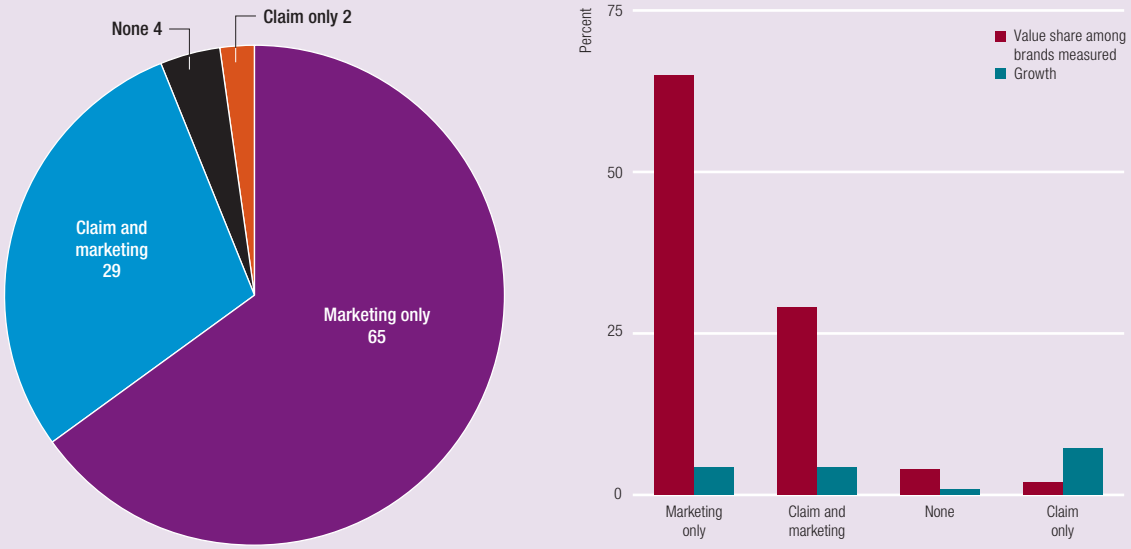
The lack of trust among producers and consumers represents another market factor that is a key obstacle in marketing environmental goods. Recent scandals in the car industry have further lowered consumer confidence in environmental claims for manufacturing goods. The Greendex survey of 2010 (see footnote 11 for details on the survey) shows that consumers widely agreed that companies make false environmental claims for their products.

Policies to minimize barriers and stimulate drivers for sustainable consumption

Mainstreaming sustainable development into national plans and global policy frameworks into national strategies may be the best way to accomplish Agenda 2030. Policies are needed to reduce barriers (such as high prices and lack of awareness) and reinforce drivers in the sustainable virtuous circle of manufacturing consumption (Box 5.5). Policies can be market based if they use markets, prices and other economic variables to reduce negative externalities or command and control policies that are the direct regulation of an industry by legislation.

“Mainstreaming sustainable development into national plans and global policy frameworks into national strategies may be the best way to accomplish Agenda 2030

Figure 5.20
Higher growth in companies adopting pro-environmental campaigns



Note: The left figure shows the percentage of total sales generated by companies adopting pro-environmental campaigns, and the right figure shows the consequent growth of revenues of those companies.
Source: The Nielsen Company (2015).

Box 5.5
The importance of policies for the domestic market of environmental goods

Empirical evidence produced by UNIDO (Cantore and Cheng 2017) shows that policies have a statistically significant impact on the domestic market of environmental goods.[1] Using a panel of 71 countries (38 developed countries and 33 developing countries) in 1988–2015 the determinants of international exchange of environmental goods (as defined by the OECD classification) are analysed. A gravity model framework provides support to the idea that the exchange of environmental goods depends on the GDP of the importer, the GDP of the exporter and their geographical distance. Geographical distance approximates transaction costs.

The model provides evidence that exports of environmental goods grow as the innovation activity of the exporter is bigger and imports are reduced when environmental taxes are higher.[2] The former result is quite straightforward because it would flag that countries are more equipped to export relatively emerging technologies such as environmental goods when they are able to innovate. The finding on environmental taxes means that when environmental taxes are set in an importer country, the effect is to reduce imports of environmental goods to stimulate a domestic market. Countries accommodate the increasing demand of environmental goods generated by taxes with higher levels of domestic production of environmental goods rather than with more imports of these goods.

Notes
1. *Industrial Development Report 2016* discussed market instruments as ways to promote technological change, especially on the production side. It emphasized the cost-effectiveness of market instruments compared with “command and control” policies imposing limits on pollution (UNIDO 2015b).
2. As defined by OECD (2017a) environmental taxes are an important instrument for governments to shape relative prices of goods and services. The characteristics of such taxes included in the database (revenue, tax base, tax rates, exemptions, and so on) are used to construct the environmentally related tax revenues with a breakdown by environmental domain (water use, water pollution, waste, certain chemicals, and so on). In addition, the data have been cross-validated and complemented with revenue statistics from the OECD Tax Statistics database and official national sources.

“Consumers and producers may be in conflict over who should bear the tax burden

Market policies

The logic behind policies aimed at incentivizing sustainable consumption though market mechanisms is based on the idea that policy-makers have direct control to steer demand in some desired direction (see Chapter 6 for a taxonomy of demand-driven industrial policies). The environmental economics literature suggests that in many cases market policies are more cost-effective tools than regulation for environmental protection.

There are many examples of taxes on consumption of polluting final goods. In 2002 Ireland imposed a €0.15 tax on plastic bags in retail stores (previously bags had been free) (Convery et al. 2007). The effect was a 90 percent reduction in their use and reduced waste and littering. The costs of administration were very low (about 3 percent of revenues), because it was possible to integrate reporting and collection into existing value-added tax systems. Store owners and consumers had a very positive reaction to the introduction of this tax, probably because the main actors hurt by the reform were the plastic bag producers.

The introduction of a tax on the consumption of polluting goods is more problematic when it affects a more organized and powerful category of producers. The purchase of cars in Denmark, for example, is subject to a registration tax and a green owner tax. The annual green owner tax is based on how energy-efficient the vehicle is. It ranges from €2,740 (for cars that get less than 4.7 kilometres per litre) to €83 (for cars that get more than 20 kilometres per litre). The concept originated from research claiming that consumption-based environmental taxes should be based on the polluting impact of the good (Albrecht 2006). The Danish policy led to a sharp increase in the number of energy-efficient cars registered between 1997 and 2014, but it was severely criticized by producers, who claimed that it created uncertainty and instability in the market, which hurt their profits.

Consumers and producers may be in conflict over who should bear the tax burden. The majority of respondents to an OECD survey agreed with the fact that government policies to address environmental issues should not cost households extra money (OECD 2014). In China sales of electric and plug-in hybrid cars quadrupled to 351,000 from 2014 to 2015, boosted by a range of government subsidies to consumers (Box 5.6). Producers also benefit from government support. The incentive package increased sales of electric vehicles, but the cost-effectiveness of the producer subsidies has been controversial. In 2012 and 2014 these subsidies exceeded producers’ profits on electric vehicles.

Regulation

Yet an increase of the market for, or consumer interest in, environmental goods may not be enough to reach a sustainable path, which requires regulations both to set numerical targets or standards and to internalize the negative externalities of pollution. Between 1990 and 2008 an amendment of the *Clean Air Act* in the United States accounted for 60 percent of the reduction in air pollution emissions despite a substantial increase in manufacturing output (Shapiro and Walker 2015). The power of regulation should not be overlooked.

Green public procurement

Similarly, governments may also directly affect demand for manufacturing goods as a direct consumer (and see Chapter 6). The public sector is the largest consumer of goods and services in many countries.

Box 5.6
Incentivizing electric cars in China

Sales of electric and plug-in hybrid cars in China reached 351,000 units in 2015 (four times higher than in 2014), boosted by a range of government subsidies to consumers. The producer, too, benefits from government support.

Whereas the impact of the incentive package had a positive impact on purchases of electric vehicles, the cost-effectiveness of subsidies for producers is controversial. In 2012 and again in 2014 subsidies were greater than the producers’ profits on electric vehicles.

Source: Clifford (2016).

"Governments may also directly affect demand of manufacturing goods as a direct consumer

In the European Union, public expenditure on goods and services account for around 13 percent of GDP, some €1.8 trillion annually (Padilla 2017).

Given such volumes, governments can influence markets. Choosing goods and services with reduced environmental impact, they can make a major contribution to local, national and international sustainability goals (European Commission 2016). Governments are increasingly orienting to investments that follow sustainability criteria. According to a survey conducted by the United Nations Environment Programme (2017) 38 of 41 (93 percent) responding world national governments include sustainable public procurement in policies and strategies. Ninety-four percent of OECD countries use strategies or policies to support green public procurement (OECD 2015).

International bodies

Agenda 2030 incorporates sustainable production and consumption as a specific objective (SDG 12), implicitly acknowledging that the previous path was unsustainable: "Current trends towards sustainability are welcome but insufficient ... despite best efforts, incentives for business investment are not sufficient. Collaboration across value chains is deficient. Public policy frameworks are neither ambitious enough nor adequately coordinated at the global level" (World Economic Forum 2010).

The Montreal Protocol, however, has been a real success. Changes on international regulation of

Box 5.7

The Montreal Protocol: 30 years of influencing consumption and production patterns

In 2000 UN Secretary General Kofi Annan stated: "Perhaps the single most successful international environmental agreement to date has been the Montreal Protocol, in which states accepted the need to phase out the use of ozone-depleting substances (Annan 2000, p.56)." In its first 30 years, this agreement achieved the almost total phase-out of five groups of ozone-depleting substances (chlorofluorocarbons, halons, carbon tetrachloride, methyl chloroform and methyl bromide). It reduced the consumption and production of hydrochlorofluorocarbons by 40 percent, with a view to phasing them out entirely by 2030. With the amendment adopted in Kigali in November 2016, the Montreal Protocol includes hydrofluorocarbons in the group of controlled substances and regulates their phase-down, extending its mission to mitigating climate change.

Phasing out ozone-depleting substances has been a challenge for all countries. But it has also been an opportunity to introduce state-of-the-art technologies and better resource management methods and to improve energy efficiency and competitiveness. Although the Montreal Protocol does not explicitly mention sustainable consumption, it secured changes to consumption and production patterns at the country level. It created a huge new international market for chemical products and equipment that replace ozone-depleting substances. Industry developed a wide range of technologies. The protocol's strong policy framework is based on shared responsibilities between governments and industry that allow industry to plan for the long term and encourage research and innovation. One of its basic principles is to intervene in the production and supply of chemicals rather than at the level of emission sources.

Goods produced with ozone-neutral processes, including asthma inhalers, vegetables, insulation materials and cooling devices, are of the same or even better quality than the products they replaced. This achievement is particularly notable in the refrigeration and air conditioning sector. As emerging markets grow, more and more people can afford cooling appliances (50 million air conditioning units were sold in China in 2010 alone). Despite the growing global demand for cooling technologies, manufacturing and chemical industries have not compromised on environmental considerations. Thanks to the Montreal Protocol, they are still striving for benign and energy-efficient solutions.

Several factors explain the success of the Montreal Protocol. They include:

- Easily identifiable and measurable environmental benefits.
- Global engagement, following differential treatment of developed and developing countries.
- Special institutional set-up, including a dedicated funding mechanism to assist developing countries and transition economies, and overall global institutional support.
- Defined phase-out schedules with relatively easily achievable interim targets.
- Close involvement of industry.

"A global target for sustainable consumption represents a unique opportunity to engage the main actors involved in a radical change of current consumption patterns

Table 5.1
Diffusion of the EU Ecolabel in EU countries

Year	Number of companies	Number of licences	Number of products	Share of people who have seen, heard of or bought Ecolabel products (percent)
2001	83	95		
2002		128		
2003		166		
2004		224		
2005	250	279		
2006		386		11
2007		514		
2008		754		
2009		1,015		37
2010		1,064		
2011	887	1,357	18,935	
2012	> 1,000	1,671	17,176	
2013		2,086	37,215	
2014		1,910	43,157	
2015		2,031	44,711	

Source: Evans et al. (2015).

production were key drivers to stimulate different sustainable consumption patterns (Box 5.7).

The success of the Montreal Protocol notwithstanding, international organizations and agreements face many challenges:

- Multilateral agreements often focus on a specific environmental problem and cannot tackle the different issues of sustainable consumption as a whole.
- Countries tend to free ride (Barrett 1994). Multilateral agreements may not be enough to reach a sustainable path.
- International organizations can help implement multilateral agreements and/or support domestic policies at the country or regional level, but they are rarely in a position to activate coordinated action globally.
- Multilateral agreements may not generate enough impact to activate a sustainable path.

A global target for sustainable consumption represents a unique opportunity to engage international organizations, governments, businesses and civil society to organize for a radical change of current production standards and consumption patterns. This will stimulate the main actors involved in the process (consumers, firms, policy-makers and international organizations) to contribute in rendering the virtuous circle of the manufacturing consumption environmentally sustainable.

Notes

1. This definition is inspired by the Oslo Symposium of 1994, which states that sustainable consumption and production is "the use of services and related products, which respond to basic needs and bring a better quality of life while minimizing the use of natural resources and toxic materials as well as the emissions of waste and pollutants over the life cycle of the service or product so as not to jeopardize the needs of future generations" (Norwegian Ministry of Environment 1994).
2. According to European Commission statistics the main source of scrap in Europe is the construction sector (33 percent). Manufacturing accounts for about 10 percent, mining 30 percent and households 8 percent.
3. As emphasized in Steenblick (2005), the OECD list of environmental goods is far from being exhaustive and does not cover all environmental goods.
4. This graph (covering selected years on the basis of data cleaning) updates *Industrial Development Report 2016* estimates finding that environmental goods represent up to 5 percent of total exports in developed and developing countries. The *Industrial Development Report 2018* graph of environmental goods still shows that environmental goods are a small market segment, but it also shows that the share may reach up to 8 percent and an increasing trend in developed and in developing countries. *Industrial Development Report 2018* relies on broader country coverage (147 countries vs. 70 countries in the 2016 report).
5. The Greendex survey asks 18,000 consumers in 18 countries about their energy use and conservation, transportation choices, food sources, use of green versus conventional products, attitudes towards the environment and sustainability and knowledge of environmental issues (see http://environment.nationalgeographic.com/environment/greendex/).
6. "A production system that sustains the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Organic Agriculture combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved" (IFOAM 2005).

Chapter 6

Demand-driven policies to foster manufacturing in developing countries: Can they be inclusive and sustainable?

Rationales for demand-driven industrial policy interventions

The virtuous circle of manufacturing consumption involves a recursive process of income generation, product diversification, quality upgrading, mass consumption and changes in volumes and relative prices of manufacturing products as well as links to innovation, production efficiency and productivity gains. Various factors—including gains in disposable incomes, the contributions of domestic and external markets and the interactions between systems of supply and demand as drivers of industrialization—determine whether the circle is set in motion.

The preceding chapters highlight the opportunities as well as the trade-offs associated with the different stages of the circle. They offer guidance on how to make the circle inclusive and sustainable. They also identify the trade-offs between the promotion of demand for manufacturing and the building of domestic manufacturing capabilities, or the challenges to balance between domestic and external demand for manufactured products. Likewise discussed were the tensions between massification, diversification and commodification of manufacturing exports.

This chapter illustrates how policy-makers in developing countries have used policy interventions to address some of these trade-offs. Building on case studies in Africa, Asia and Latin America, it explores some policy responses to the dynamics of demand for manufactured goods as a driver of industrialization. The findings indicate that in addition to changes in demand for manufactured goods, changes in institutional frameworks and public policy or technological innovation can lead to enhanced—and sometimes unexpected—opportunities for industrialization. Minimum productive capacities are needed to be ready to react to them.

Demand for manufactured goods can be a framework condition, partially or completely outside the control of policy-makers, or a variable that can be affected by industrial policy. Factors such as the size of the economy and the domestic market, the strength of domestic technological and manufacturing capabilities, the relative endowment of resources with high value for manufacturing, the extent of international collaboration and forms of insertion into value chains, the relative weight of domestic or external markets and even the definition of and balance between often conflicting policy priorities can determine the ability to use demand as a driver of growth.

If demand for manufactured goods is a framework condition, governments can play at least three distinct roles. They can:

- Facilitate the correction of market failures, so that domestic firms can build on current comparative advantages to take advantage of emerging demand opportunities.
- Promote technological change and the building of productive capacities, so that domestic firms can enter sectors that they would otherwise be unable to develop given the country's traditional comparative advantages.
- Develop capacities such as technological foresight services, to help domestic firms identify or anticipate changes in demand for manufacturing products.

If demand for manufactured goods is responsive to active policy intervention, governments can play four roles. They can be:

- Information providers and awareness raisers who signal not only market opportunities but also desired directions for industrialization and consumer behaviour related to manufacturing products.
- Regulators.
- Generators or co-generators of innovation.
- Consumers of manufactured goods (through public procurement).

The chapter shows that demand-driven policy instruments are heterogeneous and can be tailored to

“Improved income distribution, fighting poverty and a thriving middle class can enhance domestic markets for manufacturing goods

suit different government roles and development outcomes. These instruments are best understood within complex policy mixes, in interaction with supply-driven interventions. Policy-makers need to consider synergies between industrial and other broader development policies with implications for the direction and pace of industrialization. Governments need to set clear priorities and goals and be aware of possible trade-offs between policy tools and intended targets. Enhanced monitoring and evaluation is needed to better codify experiences in the use of such instruments.

Traditional economic goals remain top priorities for policy-makers. However, consistent with modern approaches to industrial policy, this chapter acknowledges growing concerns about inclusiveness and environmental sustainability. The goals are to ensure that industrialization better serves the poor and incorporates segments of the population that have been excluded from consumption of manufacturing products by geographical dispersion, social fragmentation or political disenfranchisement.

This chapter provides evidence on the use of industrial policy tools to influence demand for manufacturing. Some tools are well established, although the objectives they pursue can be broader than in earlier years. Other tools have been redesigned to match specific goals. New tools or approaches are also being explored, with varied degrees of adherence to current rules governing international trade and investment.

The policy framework

The process of structural transformation—a term commonly used to describe the evolution from an agriculture-based economy to a more diversified, technologically complex, manufacturing-driven economy—is cumbersome. It requires time, a sustained commitment of resources and careful balancing between a supply push and a demand pull for manufactured goods. The creation of productive and technological capabilities to sustain productivity growth, employment and income generation is a necessary yet insufficient condition for long-run economic development. There is also a need to ensure that adequate demand for new or improved manufactured goods exists or can be fostered or otherwise created. Only in such a way are the dynamics of industrial development possible and sustainable (Saviotti 2001, Saviotti and Pyka 2013).

Modern approaches to industrial policy highlight the need for enhanced synergies as well as mindfulness of trade-offs between industrial and other policies. As noted in *Industrial Development Report 2016,* policy-makers face the challenge of delivering “win-win-win solutions, simultaneously balancing growth, environmental and social concerns,” all of which are both key ingredients in and outcomes of industrialization (UNIDO 2015b, p.148). Decisions made by a ministry of industry can have effects on areas such as health, and decisions made by ministries of health or other social sectors can uncover the need for interventions to promote development of manufacturing activities (Shadlen and Massard da Fonseca 2013). Bridges for some gaps in manufacturing capacities are needed to provide goods and services of high societal value.

Stiglitz (2017) recommends demand-driven industrial policies to enhance diversification and promote economic transformation. Initiatives to improve income distribution, fight poverty and help the middle class thrive should help increase the size of domestic markets for manufacturing products. This chapter provides evidence on the ways in which policy-makers have implemented or are implementing demand-driven industrial policies to tackle some challenges stemming from an increasingly complex multiplicity of development goals linked to industrialization.

Taxonomy of demand-driven industrial policy interventions

This chapter proposes a taxonomy that draws extensively from three interconnected strands of literature: demand-driven innovation policies, industrial policy and sustainable consumption policies.[1]

The structure acknowledges the distinction between demand for manufacturing products as a framework condition and as a variable that can be influenced by policy. It identifies the roles governments

“Demand-driven policies can be mandatory or voluntary, operate at the national and international level and be applied by carrot or stick

play through demand-driven industrial policy interventions. It also brings to the fore the mechanisms that influence the formation of consumer preferences or enhance consumers' capacity to take up a constant flow of innovative goods.

Demand-driven policies can be mandatory or voluntary, they can operate at the national and international level and they can be applied by carrot or stick. Governments can pursue multiple objectives alongside, or in conjunction with, supply-driven policy tools. By targeting final demand, governments seek to influence consumers' willingness to purchase a product that, in the end, is the result of a value system that encompasses all necessary activities required by manufacturing firms to transform raw materials into products for final users (Priem et al. 2012).

Table 6.1 summarizes the major roles governments can play through demand-driven industrial policy interventions. The top part of the table indicates where policy-makers may be able to design interventions that

Table 6.1
Government roles and industrial policy interventions for demand as a framework condition or an actionable variable

Nature of demand/ role of government	Description of intervention	Examples of interventions
Framework condition		
Facilitator of industrialization and upgrading	Remove market failures so that firms can build on comparative advantages to take advantage of external demand conditions or opportunities for industrialization.	• Fiscal, monetary, exchange rate and employment policies • Provision of credits or loan guarantees • Incentives for foreign direct investment (FDI) • Export promotion and competition policies
Technological capability-building partner	Promote adoption, use and (eventually) development of technologies that enhance knowledge bases and presence in domestic and international markets.	• Selective industry protection • Creation of public research centres • Promotion of corporate research and development • Technology transfer mechanisms and joint venture agreements • Export promotion • Import substitution • Selective FDI • Skills training
Market antenna	Help domestic agents identify or anticipate changes in technologies with implications for the dynamics of manufacturing.	• Foresight services and market intelligence
Actionable variable		
Information provider and/or awareness raiser	Influence consumer knowledge, awareness, readiness and capabilities to consume certain manufacturing products.	• Communication, education and awareness-raising campaigns • National brands • Voluntary labelling
Regulator	Stimulate and regulate consumption of manufacturing products or influence consumer behaviour through changes in relative prices.	• Fiscal (taxes, tariffs, quotas, subsidies, tax credits or exemptions); monetary; and exchange rate policies
	Influence consumption of manufacturing products or guide consumer behaviour through laws, directives and regulations.	• Mandatory standards and labels
Enabler/co-generator of innovation	Promote, enhance or create demand for innovative products by targeting final users.	• Grants and subsidies for consumption of innovation
Consumer	Promote consumption of manufacturing products, guide strategic investments in innovation, address societal needs through provision of manufactured goods and ensure a market for strategic industries or economic activities.	• Public procurement

Source: UNIDO elaboration based on Santiago Rodríguez and Weiss (2017), Santiago Rodríguez et al. (2017) and Lin and Chang (2009).

"Industrial policies built on comparative advantages propose that a key role of government is to facilitate the growth of the private sector

help domestic agents benefit from external market dynamics. Policy considerations frequently revolve around traditional supply-driven industrial policies, including trade- or exchange rate-related regimes; interventions condition the ability of domestic firms to tap into foreign demand through, for example, diversification and upgrading (previous Industrial Development Reports have delved extensively into some of these policy issues). The bottom part of the table characterizes cases in which policy-makers have more leeway to steer demand in desired directions.

Demand as a framework condition for industrialization

The first two roles identified in Table 6.1 reflect opposed stances regarding the extent to which industrial policies in developing countries should conform to or defy comparative advantage.[2] The third category falls easily into either camp. Industrial policies to respond to demand as a framework condition generally target entrepreneurial behaviour or business and investment environments conditioning the competitiveness and profitability of firms. Of importance are exchange rate and monetary policies; investment in general infrastructure (power supplies, roads, ports); and the governance of international trade and investment. Government interventions can target specific market segments or industries considered strategically important for competitiveness and long-term economic development.

Government as a facilitator of the removal of market failures

Advocates of industrial policies built on comparative advantages propose that the role of the government is to facilitate the growth of the private sector, the ultimate driver of industrialization. Public policies should level the playing field and create conditions to "initiate and support long-run sustained improvements in factors and productivity" (Lin and Chang 2009, p.2), helping domestic firms overcome market failures and enhancing their ability to exploit their country's comparative advantage. A country's industrial structure is endogenously determined by its endowment of natural resources, labour and so on, as well as by policies that facilitate mobility of productive factors towards more productive activities.

Chapter 4 of this report is consistent with these "competitive advantage–following" strategies. To capture income from global demand for manufactured goods, policy-makers need to support learning through exporting and the continuous upgrading of the manufacturing export portfolio, in order to avoid the risk of deteriorating terms of trade associated with commodification processes. Policies to foster innovation and technological change can improve export prices and the terms of trade. The strategic choice of export markets is also relevant, because it can facilitate economies of scale and upgrading processes. On diversification, some evidence reflects the mainstream literature, which argues that successful industrial diversification builds gradually on existing strengths and that complementary competences must be built.

The experience of the mineral coltan (columbite-tantalite) in the Democratic Republic of the Congo shows that the ability to build on natural resource endowments depends on the strength of the state and its ability to stimulate the development of endogenous industrial capacities. Despite policy interventions adopted at the international level and a few at the national level, coltan remains a conflict mineral; small-scale gold miners and warring armed groups control the mines (Bleischwitz et al. 2012). Lack of state control over the territory and poor enforcement of property rights diminish the institutional capacities needed to benefit from global demand for coltan (Bleischwitz et al. 2012, UNSC 2015, Usanov et al. 2013).

A more positive example of a strategy to remove market barriers, attract foreign investment and boost industrialization based on existing comparative advantage refers to Chile and its efforts at tapping into the huge and growing global demand for lithium based products.[3] Chilean authorities seek to develop domestic lithium processing capacities by capitalizing on the country's improved business environment conditions, increased openness and attractiveness to foreign

"The public sector can help domestic firms comply with quality and regulatory standards required to compete in export markets

investors as a source of know-how and technology transfer, and its massive reserves of lithium—Chile is the second-largest producer in the world, behind only Australia (Jaskula 2017). Although Chile maintains tight controls and quotas on lithium extraction —only two companies possess extraction rights, the American firm Albemarle and Sociedad Química y Minera de Chile S.A.—it is internationally recognized as offering a friendly environment for businesses in the sector.

On 30 March 2017, the Chilean Economic Development Agency (CORFO) and the Foreign Investment Promotion Agency (InvestChile) launched an international bid to attract investment in the domestic development of industries that use lithium as a main input, including lithium batteries and their components. The winning companies, to be announced by end-2017, will benefit from guaranteed access to up to 25 percent of Albemarle's lithium production over about 27 years. They will be granted the lowest price of lithium available in the export market during the previous six month-period. An additional factor driving the attractiveness of this bidding process is its pairing with major investment plans in infrastructure for alternative energy sources, notably solar power generation (CORFO and InvestChile 2017).

The public sector can help domestic firms comply with quality and regulatory standards related to characteristics of products or underlying production processes in important export markets. Doing so should help them avoid persistent declines in manufacturing export prices. Improving quality standards and upgrading production practices can also support developing countries in adding value to natural resource endowments and transforming them into higher-quality exports.

In Rwanda the national government, with assistance from donor organizations, the private sector and non-governmental organizations (NGOs), has made large investments in upgrading the coffee industry. Standards and certification have been selectively applied as a way to increase exports (Box 6.1).

Box 6.1
Upgrading the quality of coffee in Rwanda through standards and certification

In 2002 the government adopted a strategy intended to reposition Rwanda as a speciality producer of high-quality, fully washed coffee beans—a segment of the industry that offers more stable world prices and higher value than lower-grade beans. Quality upgrading became a central pillar of the strategy to boost exports.

The collaborative strategy involved the National Agricultural Exports Board, the private sector, international donors and NGOs. In addition to promoting coffee-washing stations, the strategy included capacity-building programmes, the establishment of farmer cooperatives and adoption of standards and certification (Jaffee et al. 2011, Karuretwa 2016). The multi-stakeholder collaboration gives coffee producers access to public investments in infrastructure, skills training, capacity-building programmes for coffee certification and verification for speciality coffee (targeting professional certifiers), sustainable credit guarantee programmes (empowering smallholder farmers to facilitate exports via process upgrading); promotes the establishment of cupping labs (consistent methodologies for assessing a coffee's quality before determining a price on a lot); and develops technical expertise (NAEB 2014, Karuretwa 2016).

Rwanda has put in place 245 coffee washing stations, six laboratories to certify the quality of coffee and one roasting factory. According to the Fair Trade Africa database, seven coffee cooperatives covering 23,000 small-scale producers have been fair-trade certified in Rwanda (Jaffee et al. 2011, NAEB 2015).

Certification by the National Agricultural Export Development Board is a precondition for obtaining an export licence in Rwanda. The Rwandan Standards Board offers certification ranging from the national *Standardisation Mark* and *Excellence Mark* to various certificates of the International Organization for Standardization (ISO). Several laboratories in the East African Community region offer certification for exports to the European Union and other regions with more stringent standards. A range of voluntary and additional quality certifications, such as fair trade and organic labels, have also been introduced in Rwanda (Laterite 2016).

"Governments can invest in capabilities that allow countries to diversify beyond their traditional comparative advantage

Government as a technological capability–building partner

This second framework condition role sees governments as more proactive. Governments can invest in technological and productive capabilities that allow countries to engage in economic activities outside the scope of their current endowments and traditional comparative advantages. This notion of technological capability is at the heart of policies that target the development of specific firms or sectors through deliberate and strategically managed protection against foreign competition. Strategies based on this notion involve heavy investments but are highly uncertain. Moreover, based on the experiences of some Latin American countries during the import substitution period of roughly the 1950s to the 1970s, policy intervention may turn out to be more damaging than helpful, a problem identified as government failure.[4]

Successful examples of countries that have managed to industrialize building on active and effective government-led, export-oriented, capability-building strategies can be found in Asia. These countries used external demand to boost structural change and underpin development of technologically sophisticated manufacturing activities. The Republic of Korea is a paradigmatic case. Despite the generally disappointing performance of Latin American countries regarding competitive advantage–defying industrialization strategies, the commercial aircraft industry in Brazil offers an example of a successful experience in the region.[5]

The Republic of Korea

Starting in the 1960s, the Republic of Korea has achieved a radical structural change to become a global industrial and innovation leader (OECD 2012). Because of its ability to sustain a high growth pattern, it is considered a recent graduate to the group of most industrialized, high-income economies. At the core of the strategy was a series of national Five-Year Economic Development Plans. Starting in 1962, these plans set targets linked to specific lines of action and resources allocation; the government carefully revised and upgraded targets in line with progress and objectives achieved. Equally relevant was the sequencing and coherence built into key policy interventions. The highest priority for industrial policy was the development of industries with increasing knowledge content. Heavy investment in human capital through literacy and excellence in training and research was aligned with rising demand for skilled labour according to the changing needs of domestic industry. Trade policies selectively combined import restrictions and export incentives, and managed exchange rates favoured export markets as the main source of demand for domestic products.

Modernization and technological upgrading of domestic industries changed gradually, from creating domestic scientific and technological capabilities and learning from foreign best practices in the early stages of rapid industrialization to supporting business ventures and improving the leadership of the private sector (OECD 2012). As this sector took over, government intervention gradually phased out. From an initial stance of promoting overall economic development, the government has shifted increasingly to sustainable development. National Five-year economic development plans have given way to more focused, issues-based development plans, which include green growth (OECD 2012).

Brazil

Although Brazil has long been home to aircraft design and manufacturing, large-scale industrial activities are linked to the foundation of Embraer, one of the world's top three manufacturers of commercial aircraft.

A combination of factors helped usher in a new phase in the Brazilian aircraft design and manufacturing industry (Vértesy 2017). These factors involved public procurement (particularly through the Brazilian Air Force) and a favourable regulatory framework for Embraer,[6] higher global demand for a specific aircraft type (regional jets), strategic provision of finance,[7] the availability of technology on the market, a corresponding innovation strategy and the necessary preconditions and domestic productive and

"Technological vigilance helps decision-making and planning by determining the current state of the scientific and technological environment

technological capacities to respond to these opportunities.[8] Although a market orientation was essential for long-term growth, key policy interventions enabled Embraer to respond to emerging demands in certain market segments.[9]

Government as an antenna with which to foresee technological changes

Governments can assist domestic firms in identifying emerging changes in demand for manufactured goods. Pietrobelli and Puppato (2015) argue that policy-makers in developing countries need to take seriously the link between technology foresight and broader industrial development strategies. Such links play major roles in shaping the direction of technological change and economic growth (Box 6.2).

A closely related tool is technological vigilance, which refers to efforts to determine the current state of the scientific, technical and technological environment to enable decision-making and planning. Information is disseminated to increase the capacity to anticipate technological, social and/or commercial opportunities for industrialization, including threats.

A formal effort to develop capabilities for technological vigilance is Antena Tecnológica (Technological Antenna), launched in 2013 by Argentina's Ministry of Science, Technology and Productive Innovation, with the Argentinean Industrial Association (MINCYT n.d.). Antena Tecnológica is a free, web-based platform for technological vigilance and competitive intelligence. Its intended audience includes the private sector, universities and other research organizations. Users can access information on technological trends, regulatory changes, emerging business opportunities, results from academic research and other topics locally and globally through electronic bulletins, a library of documents and specialized studies on selected manufacturing sectors (MINCYT n.d.).

Box 6.2
Anticipating technological changes in manufacturing through technological foresight

Developing countries need to implement strategic investments and introduce policies that allow them to bridge the gap to the technological frontier. Doing so requires developing the ability to dominate certain market segments, minimize uncertainty and risk and cope with complexity. Policy-makers should foster the participation of multiple actors and sectors.

Technology foresight—a systematic effort to scrutinize science, technology and innovation dynamics and their potential impact on society—offers some tools. It involves the participation of multiple agents, including government, science and technology practitioners, industry, civil society and other stakeholders, who systematically appraise the shape and orientation of future technological change in order to promote collective action, leading to gains in sustainable socioeconomic development outcomes.

Features of technology foresight include the following:

- Systematic attempts to predict the future and to rally collective action and build consensus on and ownership of how to make the future happen. Foresight supports prioritization, the development of thematic portfolios and the identification of critical technologies to inform strategic investments.
- Participation of a broad set of agents in debates on innovation and industrial policies, widening the scope of policy interventions. Private sector participation is essential to facilitate coherence and consistency between technological foresight and the industrialization strategy.
- Flexibility at multiple levels (supranational, national, regional and so on).
- The potential to align efforts in science, technology, innovation and manufacturing to maximize socioeconomic and environmental impacts.

Source: Pietrobelli and Puppato (2015).

Demand for manufactured goods as an actionable variable

The bottom half of Table 6.1 captures situations in which demand for manufacturing is responsive to policy interventions, allowing demand-driven instruments to be deployed to foster industrialization. Economic outcomes such as employment, productivity growth and competitiveness in domestic and export markets remain core areas of public intervention. Demand-driven instruments also broaden the scope of government intervention to address concerns about inclusiveness and environmental sustainability.

"Governments can enhance consumers' knowledge about, preferences for and readiness and capabilities to purchase products

Government as information provider and awareness raiser

Governments can provide information on product qualities, usage and other characteristics. They can also enhance consumers' knowledge about, preferences for and readiness and capabilities to purchase products. Initiatives can take the form of voluntary or mandatory labelling, communication and awareness campaigns, mainstream education, social media, marketing and public or community participation, as well as data collection, the development of indicators and audits (see Chapter 5 on raising awareness).

Enhanced labelling requirements often seek increased transparency and consumer education. The most viable labels are those verified by third parties (OECD 2008). International efforts include the fair-trade label, which promotes sustainable consumption by helping consumers identify socially fair and environmentally friendly products that meet strict standards (UNDESA 2010, UNEP 2012).

Eco-labels seek to stimulate more sustainable consumption by improving the visibility of environmentally friendly goods (Box 6.3). They can serve as benchmarking tools for differentiating firms from competitors or as a way of rewarding innovation and leadership in the marketplace (Shingrup 2013). They can be voluntary or compulsory.

Chapter 3 stresses the importance of domestic demand, particularly household consumption and a thriving middle class, as drivers of manufacturing development. Some developing countries are seeking to foster demand for domestic industries through local content and national branding campaigns targeting domestic consumers. These campaigns seek to divert consumption of domestic manufacturing products by helping consumers differentiate between goods produced with national and imported inputs (Table 6.2).

Government as regulator

Governments can use regulation to affect demand for manufactured goods. They can introduce positive incentives (such as subsidies and tax exemptions) and negative incentives (such as bans and taxes). Regulatory measures can improve product quality and manufacturing processes and negate some of the adverse consequences of manufacturing products on health, the environment and safety (OECD 2011a).

Governments can also introduce non-financial measures—laws, directives and regulations—that either reward or penalize the consumption of products. These measures target local or national authorities; producers or retailers; and, to a lesser extent, final consumers (BIO Intelligence Service 2012). An example is the adoption of standards to improve the quality of manufactured products to meet export requirements or achieve inclusiveness, health, welfare, environmental protection or security targets. Governments can ban certain manufacturing products or harmful substances and require enforcement and monitoring measures. Rwanda, for instance, has banned the use of plastic bags (UNEP 2012).

Shadlen and Massard da Fonseca (2013) assert that regulatory measures can create synergies between industrial and other social- or health-related policies.

Box 6.3
Eco-labelling in India

The Indian government has introduced incentives to green its domestic manufacturing industry and increase its competitiveness. In parallel, it has promoted the adoption of voluntary labels to increase consumer awareness of and preference for environmental goods.

In 2006 the Ministry of Power implemented a new, voluntary standards and labelling scheme to help consumers make informed choices about energy saving and cost-saving products. The Bureau of Energy Efficiency promotes and facilitates adoption of this scheme and prescribes minimum energy performance standards that are "validated" through labels affixed to appliances. Its label has become obligatory for 5 product groups and remains voluntary for another 16 (Bureau of Energy Efficiency India 2016). The scheme has introduced robust models for monitoring and verification, media campaigns and public procurement of energy-efficient appliances.

Source: Santiago Rodríguez and Weiss (2017).

> **Local content and national branding campaigns targeting domestic consumers seek to divert consumption of domestic manufacturing products**

Table 6.2
Features and benefits of national brand campaigns to foster local content and consumption of domestic manufacturing products

Program	Website	Period	Goals	Strategic objectives	Benefits	
					For consumers	For manufacturing industry
Primero Ecuador	www.primeroecuador.com/	Since 2009	• Foster national markets and industrial development • Improve competitiveness and consumption of national products	• Promote good-quality national production in line with Ecuador´s national policy and legislative framework • Foster national production and commerce • Foster national consumption of local goods that are socially and environmental responsible • Maintain quality criteria and standards • Increase awareness about the importance and value of Ecuador´s production	Ensures quality and socially and environmentally responsible products	• Increases local content • Improves access for licensees to funding, national promotion via various distribution channels and long-term profitability
Buy Uganda—Build Uganda	www.mtic.go.ug/images/policies/bubu.pdf	Approved by Cabinet in 2014, implemented since June 2016	• Increase consumption of local products through public procurement • Encourage private consumers to buy local products • Increase share of local firms in domestic trade	• Take stock of local producers and improve their productive capacity • Enhance quality and competitiveness of local products • Increase efficiency and participation of local firms in public procurement • Increase visibility of local products in local outlets • Increase awareness of the policy	Not specified	• Enhances profitability of local producers and suppliers of domestic products • Increases competitiveness of local products • Spurs growth of small and medium-size (SME) enterprises • Creates employment
Proudly South African	www.proudlysa.co.za	Since 2001; built on Australian model	Encourage South Africans to make personal and organizational contributions to economic growth	• Promote sustainable job creation • Ensure fair job standards to protect rights of workers • Improve production and consumption of quality domestic manufactured goods and services • Ensure environmentally responsible management practices • Engender pride and patriotism • Promote “buy local” activism	Not specified	• Increases participation by government, business, trades unions and organized communities • Increases local production (at least 50 percent of cost of production must be incurred in South Africa, with substantial processing of imported materials) • Creates jobs (adoption of *Local Procurement Accord* intended to create five million jobs by 2020)

(continued)

Table 6.2 *(continued)*
Features and benefits of national brand campaigns to foster local content and consumption of domestic manufacturing products

Program	Website	Period	Goals	Strategic objectives	Benefits	
					For consumers	For manufacturing industry
Buy Made in Rwanda	www.rdb.rw/home/newsdetails/article/made-in-rwanda-expo-an-appeal-for-local-products-consumption.html	In development since 2014	• Boost domestic production and stimulate local consumption habits • Reduce trade deficit • Promote growth of Rwandan enterprises	• Generate off-farm employment by developing manufacturing • Promote investment in energy, machinery and information and communications technology (ICT), in order to expand domestic value chains and improve the business climate • Give preference to local manufacturers in public procurement • Increase awareness and image of products made in Rwanda • Educate consumers about benefits of buying Rwandan goods and services	Offers good value for price	• Gives preferential treatment to Rwandan products in government procurement • Fosters good image of Rwandan manufactured goods
Make in India	www.makeinindia.com/home	Since 2014 as online platform	• Encourage domestic companies and multinationals to manufacture their products in India • Transform India into a global design and manufacturing hub	• Strengthen manufacturing industry and raise awareness of manufacturing in India • Foster demand for manufacturing by facilitating investment • Foster innovation, enhance skill development, protect intellectual property and improve manufacturing infrastructure	• Provides various incentives for consumers, particularly related to environmental goods (renewable energy, green buildings, etc.) • Improves the quality of manufactured goods	• Opens up various sectors (including defence, railways, and the space industry) for investment • Develops six industrial corridors • Establishes platform for discussing current trends and technical issues with experts • Gives public procurement preferences to producers in national investment and manufacturing zones • Enhances requirements of local value addition in specific sectors (e.g., solar energy equipment, electronic hardware, fuel efficient transport equipment, IT-based security systems, power, roads and highways, railways, aviation and ports)

Source: Santiago Rodríguez and Weiss (2017).

“The campaigns help consumers differentiate between goods produced with national and imported inputs

“In Mexico ambitious regulatory reform has focused on modifying the domestic market for generic drugs

In Mexico ambitious regulatory reform has focused on modifying the domestic market for generic drugs (Box 6.4). The reform helped the government strengthen its capacity to govern the domestic pharmaceutical market and enhance access to good-quality, affordable medicines. It has also promoted improvements in manufacturing practices and attracted new players to the market.

Box 6.4

Health policy as a driver of industrial policy in Mexico’s generic drug market

Marketing of pharmaceuticals in Mexico requires approval by the Federal Commission for the Protection against Sanitary Risk (COFEPRIS) via the granting of a sanitary registration. Before reform, sanitary registrations were valid indefinitely. As a result, sales of products that failed to comply with current sanitary and related legislation rose, firms could hold registrations for products they no longer sold and some “copy drugs” with suspected deficiencies in quality and safety were able to thrive (Santiago Rodríguez 2010). By 2011 Mexico faced a backlog of about 8,000 registrations (COFEPRIS 2015).

To overcome some of these regulatory challenges, beginning in 1998 the Mexican health authorities introduced regulatory reforms to foster interchangeable generics as a way to promote the manufacturing of cheaper but high-quality and safe products. Core components of the strategy included the following:

- Adoption of stricter quality requirements for drugs manufactured and marketed in the country, with emphasis on generic drugs.
- Creation of independent laboratories mandated to perform the tests required to obtain an interchangeable generic denomination.
- Consideration of both public sector demand for drugs and private consumption, tapping into the then emerging but rapidly growing market for interchangeable generics (Santiago Rodríguez 2010).
- Enhancing market competition by prescribing drugs based on active ingredients instead of brand names, and allowing consumers to buy interchangeable generics directly from the pharmacy at lower prices than innovator drugs.

Official data on the structure and performance of the domestic pharmaceutical market are sparse and often outdated, but the evidence suggests that despite some initial difficulties to ensure uptake by the local industry, the mix of supply- and demand-driven policy instruments stemming from the regulatory reform has had strong effects. Between 2011 and 2017, 15 packages of generic drugs have been introduced to market, accounting for 37 active pharmaceutical ingredients contained in 491 new generic drugs registrations and covering 71 percent of the most prevalent diseases—namely cardiovascular disease, oncology and diabetes among others—affecting the Mexican population (Radio Formula 2017). The share of generics in total pharmaceutical sales increased from 53 percent to 84 percent; while in value terms the share went from 30 percent to 52 percent, figure above those reported by several other member countries of the Organisation for Economic Co-operation and Development (OECD 2017b). On average, price reductions for final consumers are in the order of 55 percent (Radio Formula 2017).

While the reform alone has not totally reverted increasing pressures on health expenditure, there are some positive effects. The share of pharmaceutical spending in total health expenditure in Mexico was 27.2 percent in 2015—above the 18.9 percent observed in 1999, at the beginning of the reform, but below the peak of 35.9 percent in 2003 (OECD 2017b). Relative to gross domestic product (GDP), pharmaceutical spending dropped from 2.1 percent to 1.6 percent between 2003 and 2015; similarly, the share of out-of-pocket spending in total health expenditure fell from 51.0 percent in 1999 to 41.4 percent in 2015—with a peak of 55.7 percent in 2003 (OECD 2017b).

Since a new Coordinating Commission for Negotiating the Price of Medicines and other Health Inputs was created in 2011, the government has made significant savings in public procurement while increasing the volume of purchases. For example, monthly budgetary allocations have fallen over 48.5 percent from Mexican $894 million (~ $50.3 million) to Mexican $460 million (~ $25.9 million). In contrast, monthly volumes purchased have increased from 4.4 million units to 18.4 million units (Radio Formula 2017).

The number of independent laboratories—including verification units, testing laboratories and units to test interchangeability and bioequivalence—rose from about 30 in 2010 to more than 200 in 2016 (COFEPRIS 2016, Santiago Rodríguez 2010). These laboratories have helped reduce the backlog of sanitary registrations and accelerated decisions on product registration (COFEPRIS 2015).

Source: Santiago Rodríguez and Weiss (2017).

“By promoting innovation, governments can pursue economic goals, address demands of vulnerable segments of the population or protect the environment

Government as generator or co-generator of innovation

Demand-driven innovation policies are receiving growing attention. Mechanisms include grants, subsidies and other means to facilitate the uptake of innovations. By promoting innovation, governments pursue diverse objectives, from meeting traditional economic goals to addressing the demands of vulnerable segments of the population and protecting the environment.

Governments can underpin demand for innovation in three main ways: direct procurement of innovations (the public sector buys goods not yet on the market); adoption of incentives for innovation (without directly purchasing the product); and direct funding or other forms of direct support of research and development (R&D).

Examples of direct procurement of innovations include mission-oriented programmes that address some strategic government priorities and pressing societal challenges that require radical innovations and multiplayer participation and coordination. The Manhattan Project (which developed the first atomic bomb) and Project Apollo (which eventually put the first man on the moon) are two historical examples. More recent challenges calling for heavy global investment in R&D include efforts to address climate change and the surge of pandemic diseases (Foray et al. 2012). Connecting scientific and technological activities with concrete demands from the production and other sectors can be linked to the role of government as an antenna.

An example of this kind of intervention is the programme to subsidize the purchase of new-energy vehicles in China, which seeks to promote the already booming domestic car manufacturing industry while reducing its impacts on the environment, notably air pollution in urban areas (Box 6.5). This initiative is consistent with China’s national *13th Five-Year Plan 2016–2020,* which emphasizes innovation as a driver of development (The State Council, China 2016).

Incentives to innovation can involve close collaboration through public-private partnerships. For example, by providing technological solutions for use in remote and rural areas or in natural resource-driven industries, public-private partnerships can enhance agriculture innovation systems, technology transfer and capability building while leveraging public and private investments and sharing risks (Rankin et al. 2016). The development of air-control fans for poultry feeding houses in Thailand illustrates how public-private partnerships can assist in developing and commercializing small-scale technologies that help small and medium agroenterprises overcome loss of, or limited market access due to pest or disease problems.

Between 2005 and 2009, the Thai National Science and Technology Development Agency (NSCTD), and the company B.International & Technology (BITC), a subsidiary of Betagro Group, entered into a public-private partnership for innovation leading to development of new air-control fans to increase production efficiency and reduce disease risk in poultry production. The partnership was driven by NSCTD with an investment of 2.16 million Thai baht (~ $60.2 thousand), split between public (42 percent) and private sources (58 percent).

For BITC the public-private partnership served to stimulate domestic demand for a new technology with applicability in multiple sectors. The company also received tax deductions for its investment in the new technology. As a result, the company introduced PowerTECH, an air-control fan and systems for use in poultry feeding houses and other sectors, leading to additional export revenue. Poultry producers also benefited as the supplier provided loans for the acquisition of the fans; their estimated savings were equivalent to 50 percent of imported fans, and energy savings of about 20 percent in feeding houses (Rankin et al. 2016).

Government as consumer

Public sector demand can promote consumption of manufactured goods, signalling strategic directions for investments in or made by certain industries. It can boost innovation, facilitate provision of manufacturing to satisfy societal needs and ensure markets for strategic industries and economic activities to spur competitiveness and economic growth.

"Through strategic public procurement government demands certain technologies, products or services to stimulate market emergence or deepening

Box 6.5
Fostering innovation in China by subsidizing the purchase of new-energy vehicles

China's current national *Five-Year Plan* identifies strategic industries to be developed based on innovation, the greening of the industry, openness and inclusiveness. The new-energy vehicle industry is one of them (NDRC 2016). The plan sets three main targets for this industry: conserving energy, transforming and upgrading the Chinese automotive industry and improving air quality by reducing vehicle emissions (Zhang et al. 2013).

Strengthening the industry is expected to support China's efforts to reduce carbon dioxide emissions per unit of GDP by 40–45 percent from the 2005 level by end-2020. China has introduced limits on corporate average fuel consumption of newly sold vehicles of 5l/100 kilometres by 2020 and 4 litres/100 kilometres by 2025 (Zhang and Bai 2017). It is estimated that new-energy vehicles introduced in 2015 can reduce fuel consumption values from 7.02 litres to 6.67 litres/100 kilometres (Zhang and Bai 2017).

To boost demand for new-energy vehicles, China introduced consumer subsidies in 2009 as part of the pilot *Thousands of Vehicles, Tens of Cities Programme.* The subsidies offer a one-time reduction of up to 60 percent of the vehicle's final sale price. Support, from both the central and local governments, is up to 50,000 yuan (~ $7,195) for each hybrid and 60,000 yuan (~ $8,634) for each pure electric vehicle (Li et al. 2016). The subsidies are handled by the car manufacturers; the amount depends on the vehicle category, technology type and efficiency performance—a complex structure for the instrument (Gong et al. 2013).

China renewed the subsidy programme in 2014. To prevent dependence of the industry on subsidies, and to address cases of cheating by some manufacturers, the government decided in February 2017 to gradually phase out the subsidies by 2020 (The State Council, China 2017, Zhang and Bai 2017).

Eligibility for the subsidy was initially restricted to locally produced models (Marro et al. 2015). International pressures led to partial withdrawal of restrictions on the purchase of foreign vehicles. In November 2011 the Chinese government confirmed that subsidies would be available on an equal basis to foreign-invested and domestic firms. The commitment did not appear to extend equal treatment to imported vehicles. To qualify for these subsidies, foreign firms have agreed to produce new-energy vehicles through joint ventures in China, often under technology transfer conditions (Spring 2015).

The subsidy seems to have contributed significantly to the development of China's new-energy vehicle industry. Production increased from 8,368 units in 2011 to 517,000 units in 2016, and sales rose from 8,159 units to 507,000 units (CAAM n.d., REVE 2012).[1] In 2015 China became the world's largest market for electric cars, with a share of the global market of almost 1 percent (the United States' share is just 0.7 percent). In 2015 new registrations for new-energy vehicles declined in the United States and tripled in China (IEA 2016).

The use of subsidies to consumers is not free of shortcomings. In addition to the already mentioned risk of cheating behaviour, Li et al. (2016) assert that although consumers view the subsidy positively, satisfaction with it remains low, because it has failed to offset enough of the price differentials between new-energy and conventional vehicles and the purchasing cost of new-energy vehicles remain high. Li et al. (2016) indicate that the structure of the subsidy, split between central and local governments, and high transaction costs associated with the complex tier structure of the subsidy make it difficult to disseminate the benefits to potential buyers.

Note
1. In China the term "new-energy vehicle" includes all partly or fully powered electric vehicles as well as plug-in hybrid electric vehicles, battery electric vehicles and fuel-cells electric vehicle. Sales and production figures from the China Association of Automobile Manufacturers include only battery electric vehicles and plug-in hybrid electric vehicles (CAAM 2016).

Source: Santiago Rodríguez and Weiss (2017).

A common tool to promote demand is public procurement, often but not necessarily linked to local content requirements.[10] This section examines three subcategories of public procurement: strategic public procurement to support strategic industries, including by fostering innovation; green public procurement, which targets sustainable public consumption of manufactured goods; and inclusive public procurement, which aims to assist certain disenfranchised social groups.

Strategic public procurement occurs when government demands for certain technologies, products or services stimulate the emergence or deepening of markets for these products. Governments can assist firms to recover sunk costs of large and risky investments or innovation projects, they can lead users to influence uptake and diffusion of innovations and they can address financial problems or stimulate mission-oriented innovation (Foray et al. 2012, Warwick

“Strategic public procurement is helping improve access to essential medicines

2013). The e-Sri Lanka initiative uses strategic public procurement to support the development of national production capacities in ICT (Box 6.6).

South Africa's strategy for fostering domestic manufacturing includes identifying key or spillover industries, defined as industries with sufficient domestic demand and export potential. In 2017 it identified rail rolling stock as one such industry (Department of Trade and Industry, South Africa 2017, Strachan 2016). Along with supply-driven interventions such as export credits, special economic zones, technology transfer and R&D incentives, the government uses strategic public procurement and local content requirements. Its *Competitive Supplier Development Programme* requires global original equipment manufacturers to observe local content requirements and respect supplier development commitments in bids. Its local content rules, which vary by sector, require rail signalling and rolling stock to include at least 65 percent local contents and steel products and components for construction to be 100 percent local. To ensure compliance, the government requires that local content requirements be integral components of annual audits (Department of Trade and Industry, South Africa 2017, Strachan 2016).

In 2014 South Africa procured about 50 billion rand (~ $4.3 billion) of locomotives, the largest public procurement in the sector in the country's history. The process was conducted by the state-owned company Transnet, which submitted to public tender the procurement of 1,064 locomotives, including electric and diesel locomotives. The bid intended to enhance local rolling stock manufacturing capacities and contribute to the country's long-term growth objectives.

Four global original equipment manufacturers—CRRC Zhuzhou Electric Locomotive, Bombardier Transportation South Africa, General Electric South Africa and CNR Rolling Stock South Africa—were awarded contracts. Of the 1,064 locomotives, all but 66 will be built in South Africa, at Transnet Engineering facilities. Transnet will take over about 16 percent of the total build programme; about a third of this 16 percent will be subcontracted to domestic emerging engineering and manufacturing firms.

Box 6.6
Developing the capacities of small and medium-size enterprises to provide information and communication technology to Sri Lanka's public sector

Sri Lanka has a competitive ICT sector. Its companies export, employ qualified technical staff and have earned trust and recognition from domestic and international players.

In 2003 the government launched the e-Sri Lanka initiative, a $32 million programme, supported primarily by the World Bank, that features public procurement (UNCTAD 2013a). The initiative supports the development of production capacities, particularly for Sri Lankan SMEs to participate in public procurement of ICT services. Strategic public procurement, including procurement of software and hardware, is a key component of the initiative (eTenders Sri Lanka 2017).

The *e-Sri Lanka* initiative is committed to leveraging opportunities within the framework of international competitive tenders to give preferential treatment to domestic enterprises, which are awarded points (worth up to 15 percent of the total, in line with World Bank rules) during the evaluation of bids. This practice has encouraged joint ventures between local and international enterprises, which have facilitated knowledge transfer for local firms.

Source: Santiago Rodríguez and Weiss (2017).

Strategic public procurement is helping improve access to essential medicines. Some countries in Latin America are purchasing essential medicines in collaboration with the *Strategic Fund* of the Pan-American Health Organization, negotiating better prices for the procurement of essential pharmaceutical products under the aegis of the Central American Integration System through the Council of Health Ministers of Central America and the Dominican Republic (COMISCA). Participating countries include Belize, Costa Rica, the Dominican Republic, El Salvador, Guatemala, Honduras, Nicaragua and Panama.

As a regional cooperation framework, COMISCA implements the Negociación Conjunta y Compra de Medicamentos (NC-COMISCA—joint negotiation and procurement of medicines), a pooled procurement mechanism, aligned to Sustainable Development

“Dominica, the Dominican Republic, Ecuador and Guatemala provide preferential support to women-owned businesses

Goal 3 (ensuring healthy lives and promoting well-being for all at all ages). NC-COMISCA provides access to good-quality, safe and effective medicines at a unified price for the region that is lower than what each member country would obtain negotiating on its own.

The mechanism builds on a model in which buyers negotiate prices collectively, select suppliers and agree to procure from those suppliers; contracts are granted when at least three participating countries agree to the price offered by the supplier. The operation is concluded at the national level at the agreed price and volumes. *The Central American Integration System* guarantees the agreements with pharmaceutical firms. Negotiations build on mechanisms that help define products subject to pooled procurement.

NC-COMISCA has conducted nine negotiations. As of 2016, price reductions had resulted in savings of about $39 million for participating countries (COMISCA 2016).

Green public procurement

Green public procurement refers to government purchases that help achieve environmental and social goals, support sustainable companies in reducing production costs, lead to consumer education and awareness raising of sustainable consumption and increase the credibility of public authorities (UNIDO 2011b, World Bank 2012b). It was part of the national plans of Brazil, Colombia, Ghana, South Africa, the United Republic of Tanzania and Zambia (UNEP 2012). According to European regulations, products that can be procured through green contracts include energy-efficient computers and cars, renewable electricity, office furniture from sustainable timber, low-energy buildings and recycled paper (European Commission 2016).

Inclusive public procurement

Inclusive public procurement comprises public consumption of manufactured goods or innovation, the strategic allocation of quotas to ensure that minimum demand for goods is provided by certain segments of firms (including firms owned by vulnerable social groups) and similar interventions.

Dominica, the Dominican Republic, Ecuador and Guatemala provide preferential support to businesses owned by women (Box 6.7). Public procurement acts in Kenya, Namibia, South Africa and Zambia also include women-led enterprises (Santiago Rodríguez and Weiss 2017).

Box 6.7

Encouraging women-owned enterprises in the Dominican Republic to bid on public tenders

In 2008 the government of the Dominican Republic introduced a special public procurement policy aimed at empowering women. The governmental also runs support programmes to facilitate the participation of micro, small and medium-size enterprises (MSMEs) in public tenders (Compras Dominicana 2012). Under the policy, the government committed to allocate 20 percent of public procurement to MSMEs out of which 15 percent would be directed towards women-led MSMEs (Casier et al. 2015, Ministry of Women, Dominican Republic 2010). The policy required that women represent more than 50 percent of shareholders or social capital owners (Congreso Nacional, Republica Dominicana 2008).

In 2014 alone this public procurement programme helped increase participation of women in public procurement by 15 percent (Casier et al. 2015). In 2015 women-led businesses received 19 percent of the total value of total public procurement (DGCP 2015). The average monthly number of contracts issued by the public sector to women-owned MSMEs rose from 287 in 2013 to 551 in 2015. In 2013 the ratio of men to women in contract signing fell from 14:1 to 10:1. Women-led MSMEs are also showing increased interest in national tenders (Aristy Escuder 2016).

Several actions could increase the participation of women-led businesses in tendering (ITC 2014):

- Increase access to information about public procurement opportunities for women-owned businesses.
- Standardize and simplify tender processes.
- Rationalize requirements.
- Limit contract size.
- Provide enough time for tenders.

Source: Santiago Rodríguez and Weiss (2017).

> **“Demand-driven interventions enjoyed spectacular success in promoting automobile manufacturing in the Republic of Korea**

A long-term perspective on demand-driven industrial policies: The Republic of Korea’s automotive industry

Demand-driven interventions enjoyed spectacular success in promoting automobile manufacturing in the Republic of Korea, which has ranked among the world’s top five producers for the past 15 years. Webb (2007) identifies three phases in the development of the sector, each characterized by a different mix and balance of demand- and supply-driven policy instruments (Figure 6.1).

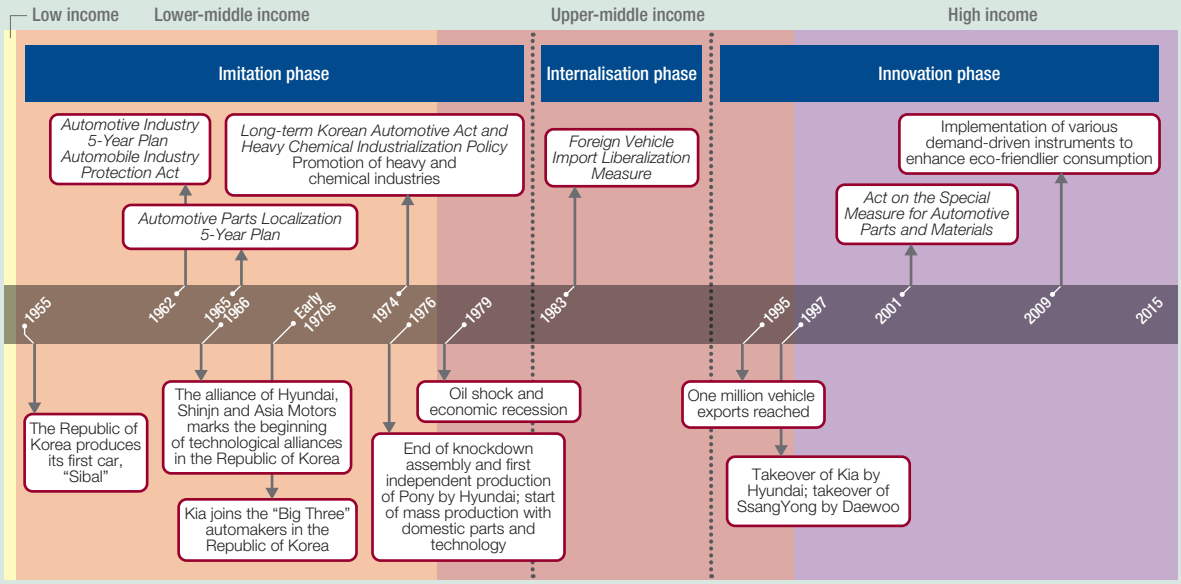
The imitation phase

The 1960s marked the beginning of the imitation phase, which lasted until the end of the 1970s. The government acted as a strong regulator, focusing on building and consolidating a world-class, highly competitive domestic car manufacturing base, reaching economies of scale and acquiring foreign technologies. An aggressive export orientation provided the main impulse from the demand side. The main policy tools included local content requirements, limits on the types of models produced, the selective attraction of foreign direct investment, tariff- and non-tariff barriers, subsidized loans, export subsidies and tax incentives, together with the building of scientific organizations to serve the industry and the promotion of technological learning through licensing (Bartzokas 2007, Cho et al. 2014, Truett and Truett 2014 and Webb 2007). In line with the classic infant industry approach, import restrictions ensured demand for domestic manufactures (OECD 2012).

The internalization phase

The imitation phase was superseded in the 1980s by the internalization phase, which began just after the oil shocks of 1979. The government promoted restructuring and consolidation to decrease the number of domestic manufacturers and gradually phased out protectionist measures (Cho et al. 2014). Restructuring was possible thanks to the level of maturity reached by domestic automakers (Lee 2011). The decade was investment driven, with sharp expansion in manufacturing and technological capabilities, in parallel with

Figure 6.1
Development of the Republic of Korea’s automotive industry: From imitation to innovation



Note: Income classification is based on the World Bank’s income classification (Atlas methodology, gross national income per capita in $) of the calendar year 2010 (World Bank n.d. b). Historical data for income per capita are from New Maddison Project Database (gross domestic product per capita in 1990 PPP$ [PPP is purchasing power parity]) (Bolt and van Zanden 2014).
Source: UNIDO elaboration based on Santiago Rodríguez et al. (2017) based on Cho et al. (2014); Webb (2007) and OECD (1999).

“Fast-paced innovation, inclusiveness and environmental sustainability are essential for industrialization to drive development and shared prosperity

market liberalization and the increasing promotion of products, as import restrictions were removed.

Korean manufacturers started to base their competitive advantage on two factors: meeting consumer preferences (by, for example, developing larger cars and offering an increased variety of vehicles) and increasing their competitiveness (based on both price and quality). By the end of the 1980s, sales of cars in the domestic market started to gain momentum.

The government maintained its active regulator role in the 1980s. According to Cho et al. (2014) to stimulate domestic demand for automobiles, the government introduced automobile-related tax credits such as the special consumption tax reduction. Diversification and expansion of the consumer base was possible via the establishment of the automobile distribution system and strengthened consumer protection policies. Efforts at expanding demand were in line with Korean automotive manufacturers' strategies to build up mass production systems, modernize production methods, expand the outsourcing of autoparts and advance towards integrated production system with mixed model production. Relaxation of regulations designating automotive as a strategic industry allowed incumbent firms to expand their offer of vehicle types and models, while new firms entered the market.

The innovation phase

The 1990s saw a transition towards the innovation-driven phase. The focus of policy intervention and the overall dynamics of the industry began to centre on the deepening of innovation capabilities in a rapidly growing domestic market (Bartzokas 2007, Cho et al. 2014). The industry had reached maturity and competitiveness, having developed substantial indigenous technological capabilities. Strong exports accompanied dramatic increases in the registration of new passenger cars, including from foreign suppliers. This strong performance in both domestic and foreign demand suggests that saturation of demand is still not an issue for the country's car manufacturers.

The government maintains its role as market regulator. It has, however, started to play a more active role as co-generator of innovation and the greening of the industry. In 2010 the government implemented a *Green Car Development Strategies and Projects* policy and introduced demand-driven instruments to spur development of green technologies and domestic consumption of eco-friendly cars. Through strategic public procurement it has sought to support and incentivize innovation by domestic small and medium-size enterprises. In parallel, the government is experimenting with consumer subsidies to promote dissemination of new-energy vehicles, signalling to domestic car manufacturers its commitment to developing this market (OECD 2011a). The most recent new-energy vehicle policy, *Mid-term Strategies and Road Map for Eco-Friendly Motor Vehicle Distribution (2014–2020)*, aims to distribute 2.2 million new-energy vehicles by 2020 (Ministry of Environment, Korea n.d., OECD 2011a).

A mix of supply- and demand-driven

The Korean government used a mix of supply- and demand-driven instruments (Table 6.3).

Concluding remarks

It only takes a minute to look around and recognize how much manufacturing activities have transformed the world we live in. Looking ahead, fast-paced innovation and concerns around inclusiveness and environmental sustainability should continue to influence industrialization as a driver of development and shared prosperity. These trends share in common questions around their impacts on employment and income, the dynamics of international trade and the efficient use of scarce resources. The virtuous circle of manufacturing consumption proposed in this Report offers a suitable framework to search answers to those questions, framing them within the interactions that characterize manufacturing production and consumption.

The emphasis on demand broadens the scope of policy-making around economic and inclusive and sustainable development outcomes, creating space for synergy between industrial and other development policies. It likewise underscores policy-making as a

“Policy efforts should consider the role of government in helping domestic agents to spot and capitalize on scientific and technological progress

Table 6.3
Policy instruments the Republic of Korea used to develop its automobile industry

Policy instrument	Phase of development		
	Imitation (1960s–1970s)	Internalization (1980s)	Innovation (1990s–2010s)
Supply-driven			
Export subsidies	✔		
Restrictions on foreign direct investment	✔		
Subsidized loans	✔		
Technology licensing	✔		
Scientific institution building	✔	✔	
Joint ventures		✔	
Technology development fund			✔
Promotion of industrial research and development			
Producer tax incentives	✔		✔
Demand-driven			
Consumer tax incentives		✔	✔
Consumer subsidies			✔
Supply- and demand-driven			
Local content requirements	✔	✔	✔
Tariff- and non-tariff barriers	✔	✔	✔
Restriction of imports	✔		
Competitiveness policies		✔	✔

Source: UNIDO elaboration.

process involving multiple stakeholders. Demand-driven policy interventions thus shape the institutional framework that allows countries to respond to current or emerging opportunities for industrialization. Governments assume different roles, implementing distinct combinations of supply- and demand-oriented interventions. Policy-makers will continue to face the challenge of balancing between policies that target supply, or demand, or both.

Countries differ hugely in productive and policy-making capacities, in the strength of the domestic market and in the conditions for their integration to global markets; therefore, readiness to tap into demand for manufacturing products as a driver of industrialization is highly contextual. For most countries in the early stages of industrialization, where demand for manufacturing is generally a framework condition, the evidence suggests that policy responses are mostly supply driven, geared to foster domestic technological and productive capabilities. Previous Industrial Development Reports, and Chapters 3 and 4 in this one, offer guidance on the kind of macro-fiscal and monetary policy instruments to hand, with industrial policy options available.

Policy efforts should also consider the role of government in helping domestic agents to spot and capitalize on scientific and technological progress, the conditions resulting from changes in the international environment around intellectual property rights, the surge of international demand for certain commodity products, or even regulatory reforms that dramatically change the rules of the game forcing innovation and adaptation to more competitive environments domestically or abroad (Lee and Malerba 2017, Perez and Soete 1988).

This chapter illustrated the kind of demand-driven instruments that policy-makers can deploy to manage demand. Regarding economic targets, public demand

“Good governance, clear objectives and a deep understanding of country contexts are needed for demand-driven policy instruments to work

can be mobilized, often in combination with setting local content requirements (strategic public procurement in South Africa's railway industry or Sri Lanka's ICT industry), exerting government regulatory powers through adoption of standards and certifications (Rwanda's coffee quality upgrading and export promotion) or by brokering knowledge and information to influence consumer awareness and choices to foster demand for domestic producers (national branding campaigns in Ecuador, Uganda and others).

On inclusiveness, one can highlight interventions that seek enhanced inclusiveness in consumption (health reform in Mexico or pooled procurement of medicines in other Latin American countries). There is also inclusiveness in manufacturing as an economic activity (quotas in strategic public procurement for women-led enterprises in the Dominican Republic or preferential access and capacity building for small and medium-size enterprises in ICT in Sri Lanka). The cases of Mexico and the NC-COMISCA show the connections between health and industrial policies.

Regarding environmental sustainability, incentives to consumers can redirect development of certain industries (subsidies for the purchase of new-energy vehicle cars in China); while in some other cases the goal can be to enhance consumers' perception of environment friendly goods (Eco-labels in India) or more directly create demand for them (public procurement of sustainable lighting solutions also in India).

From a long-term perspective, both the Republic of Korea's car manufacturing history and Brazil's experience in aircraft showed governments pursuing strategies to consolidate an industry and create economies of scale before embarking in more risky product and market diversification strategies, which tie in well to the discussion in Chapters 2 and 4.

Policy-makers need to understand their capacities and policy space in which to choose the policy mix for boosting industrialization. Debate about the use of interventions with direct implications on openness to trade or interventions that can be taken as providing undue protection to domestic industries remains contentious. However, under certain conditions it seems feasible to make use of them. Aggarwal and Evenett (2014) suggest that there is space for policy-makers to explore concrete interventions within, and even against, WTO rules, such as policies on food safety, that allow them to address pressing social objectives. Deviations from the WTO's principles of non-discriminatory treatment are possible if they are transparent, grounded in scientific evidence and other objective criteria, and adequately time-bound. The joint procurement of essential medicines in Central America shows that there is room to pursue international policy coordination within current rules on international trade and investment, and to capitalize on regional or multilateral collaboration mechanisms.

Public procurement is relevant here, given its widespread use in developed and developing countries. Kattel and Lember (2010) recognize that public procurement of innovative products is one of the most promising and powerful innovations and industrial policy tools at the disposal of policy-makers. But they also acknowledge that public procurement is prone to delivering below expectations, and highlight the strong policy capacity required to use public procurement for development, but that is missing in most developing countries. The authors urge those countries to enhance the policy capacities needed to take advantage of the complex and multi-layered industrial policy space still available under WTO rules.

Good governance, the ability to set clear objectives and a deep understanding of country contexts are needed for demand-driven policies instruments to work. Governments need to be aware of possible trade-offs between policy tools and intended targets, and should enhance their monitoring and evaluation to better codify their experiences.

Notes

1. See Santiago Rodríguez and Weiss (2017) and Santiago Rodríguez et al. (2017) for a discussion of these issues.
2. See Lin and Chang (2009) for a vivid example of some basic tenets of this debate in the literature.
3. Lithium has wide applications in global value chains. Lithium batteries for example, have widespread use in transport, energy storage and consumer electronics and devices; they enjoy a booming global demand—by 2022 the global market should double from the current $20 billion–$22 billion (CORFO and InvestChile 2017).
4. Governments may be captured by vested interests; be unable to enforce contracts or protect property rights; or encounter challenges associated with asymmetric information, rent-seeking behaviour and the potential to use industrial policy to pursue protectionist or otherwise anticompetitive goals (Lin and Chang 2009, Rodrik 2008, Warwick 2013).
5. The global aircraft industry is peculiar, because of its very high capital and technology intensities and the long lead times between the design of an aircraft prototype, its entry into service and the eventual financial break-even point. Public interventions are widespread in all market segments in industrial countries and in late industrializers.
6. Exemption from duties on imports of inputs and from trade and production taxes reduced the price of Embraer's aircraft, which relied heavily on imported parts and components. A 50 percent duty on similar imported aircraft discouraged domestic buyers from choosing competitors (Goldstein 2002).
7. Customers of Embraer could also access loans from BNDES (the Brazilian state development bank) and export finance funds from the state-owned commercial bank Banco do Brasil.
8. One of the main reasons for setting up Embraer, in 1969, was to commercialize a new aircraft design of the Aerospace Technology Centre, an advanced public research institute.
9. Interventions included establishing technological capabilities and phasing out reliance on public support; combining the pulling capacity of a state-owned enterprise with an entrepreneurial culture; using linkages with the Brazilian Air Force or the government to finance development, access technology and facilitate export market access; supporting strategic scientific and technological capacities through established public research and training centres; and adopting a diversified policy mix that provided a variety of tools, such as R&D support, financing for the development of new aircraft, military procurement, credit through the state development bank, facilitated access to technology, outright market protection (during the emerging phase), exemptions from taxes and duties, and diplomatic support (for certification and military exports). See Santiago Rodríguez et al. (2017).
10. In 2016 the market for public procurement in developing countries was valued at about $820 billion a year, about half of these countries' government budgets (World Bank Group 2016). The share in developed economies was about one-third of government spending (European Commission 2017c, World Bank Group 2016).

Part B

Trends in industrial development indicators

Chapter 7

Industrial trends: Manufacturing value added, employment, prices, exports and energy intensity

Part A of this report identifies several key trends. One is that manufacturing is the major provider of new goods, which become affordable as a result of rapid productivity gains and a steady decline in their relative prices. Another is that manufacturing exports are key to promoting broad-based economic growth. Part A also stresses the importance of moving consumption patterns towards environmental goods, rendering the virtuous circle of consumption environmentally sustainable. One way of doing so is to increase energy efficiency in manufacturing, something that is happening across country groups.

Trends in value added

Manufacturing is the key provider of new and better goods, as reflected in the evolution of manufacturing value added (MVA) at constant prices. It is a major driver of economic growth and the creation of new goods, globally and particularly in developing and emerging industrial economies.

Global MVA has increased since 1990, with a short, sharp decline in 2009 caused by the global financial crisis, particularly in industrialized economies (Figure 7.1). Growth of global MVA has been lifted by high growth rates in developing and emerging industrial economies.

Global MVA more than doubled between 1990 and 2016 to $12,316 billion (at constant 2010 prices).[1] Developing and emerging industrial economies' share doubled over this period, rising from 21.7 percent to 44.6 percent, reaching $5,494 billion at 2010 constant prices (Table 7.1).

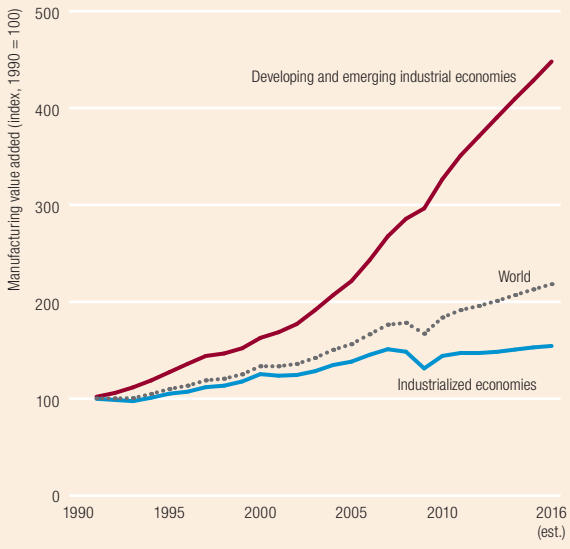
China has the world's largest share of MVA. It doubled, from 12.6 percent in 2006 to 24.4 percent in 2016. The United States, whose share declined from 20 percent to 16 percent over the period, has the second-largest share (Figure 7.2).

Manufacturing declined sharply during the global financial crisis (Figure 7.3). In 2009 MVA fell 11.6 percent in industrialized economies. It continued to grow in developing and emerging industrial economies, although the pace of annual growth slowed to 3.8 percent. Manufacturing rebounded in industrialized economies in 2010, but subsequent growth was lower than before the crisis.

Globally, the average annual rate of growth of global MVA rose slightly between 1990–2000 and 2000–2016, from 2.9 percent to 3.1 percent. It slowed in industrialized economies, from 2.3 percent to 1.3 percent, and rose in developing and emerging industrial economies, from 5.0 to 6.5 percent (Table 7.2).

China accounted for more than half the MVA produced by developing and emerging industrial economies. Average annual growth of MVA by China decelerated from 12.8 percent in 1990–2000 to 10.3 percent in 2000–2016 (Table 7.3). Other developing and emerging industrial economies showed sharp gains in their MVA growth rates. An exception

Figure 7.1
An increasing trend in global manufacturing value added



Note: All values are in constant 2010 $. Industrialization level classification is based on Annex C1, Table C1.2.
Source: UNIDO elaboration based on the Manufacturing Value Added 2017 database (UNIDO 2017f).

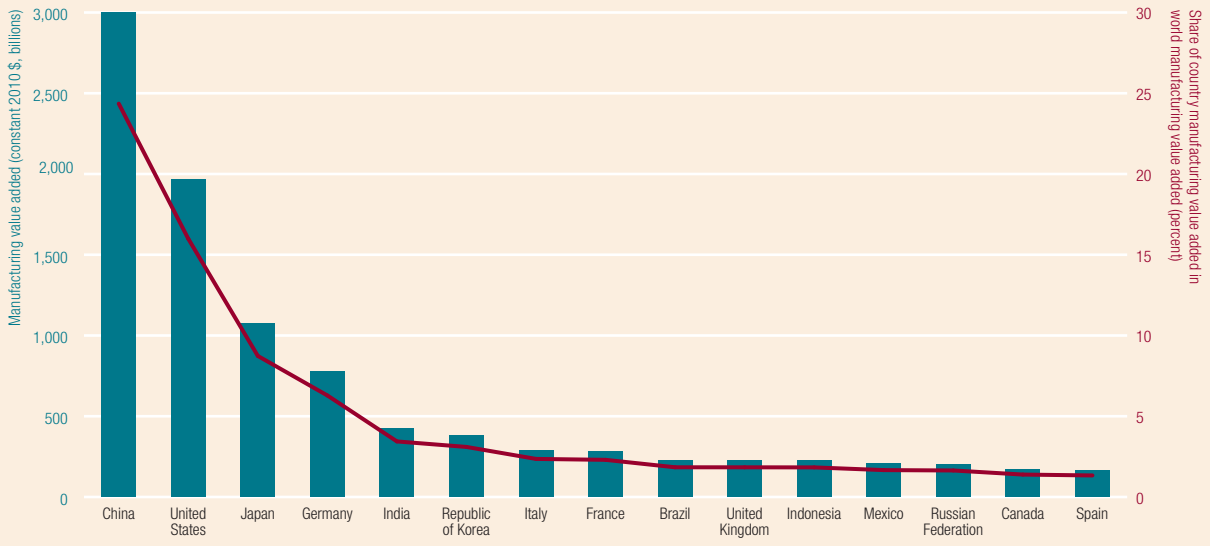
“China has the world’s largest share of MVA and accounted for more than half the MVA produced by developing and emerging industrial economies

Table 7.1
Manufacturing value added in developing and emerging industrial economies by industrialization level, development group, region and income, 1990, 2000 and 2016

Grouping	Manufacturing value added (billions, constant 2010 $)			Manufacturing value added (percent)		
	1990	2000	2016 (est.)	1990	2000	2016 (est.)
World	5,643.0	7,535.0	12,316.0	100.0	100.0	100.0
By industrialization level						
Industrialized economies	4,417.0	5,539.0	6,822.0	78.3	73.5	55.4
Developing and emerging industrial economies	1,226.0	1,997.0	5,494.0	21.7	26.5	44.6
Emerging industrial economies	1,017.0	1,738.0	4,926.0	83.0	87.0	89.7
Other developing economies	179.0	228.0	478.0	14.6	11.4	1.6
Least developed countries	30.0	30.0	91.0	2.4	1.5	8.7
By region (developing and emerging industrial economies)						
Africa	113.0	129.0	240.0	9.2	6.5	4.4
Asia and Pacific	474.0	1,085.0	4,177.0	38.6	54.3	76.0
Europe	196.0	197.0	365.0	16.0	9.9	6.6
Latin America	444.0	586.0	712.0	36.2	29.3	13.0
By income						
High income	4,482.0	5,607.0	6,971.0	79.4	74.4	56.6
Upper-middle income	853.0	1,511.0	4,282.0	15.1	20.1	34.8
Lower-middle income	270.0	383.0	980.0	4.8	5.1	8.0
Low income	39.0	34.0	84.0	0.9	0.6	1.2

Note: Regional, industrialization and income level classifications are based on, respectively, Annex C1, Tables C1.1, C1.2 and C1.3.
Source: UNIDO elaboration based on the Manufacturing Value Added 2017 database (UNIDO 2017f).

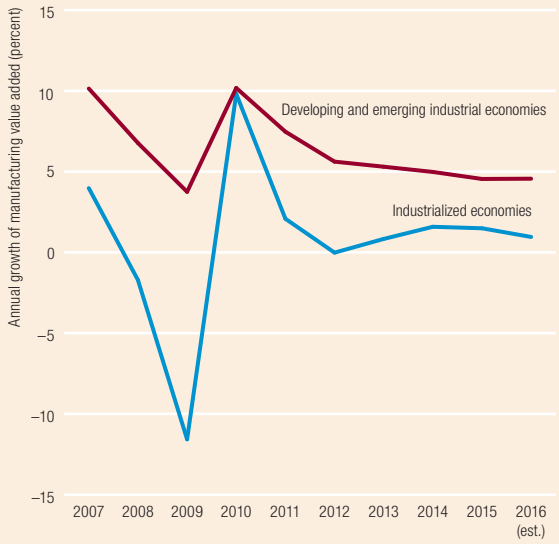
Figure 7.2
The 15 largest manufacturing producers in the world



Note: All values are estimates for 2016.
Source: UNIDO elaboration based on the Manufacturing Value Added 2017 database (UNIDO 2017f).

“World MVA has grown slightly faster than GDP, strongly influenced by high MVA growth in developing and emerging industrial economies

Figure 7.3
Annual growth of manufacturing value added reflects a recovery of manufacturing after the global financial crisis



Note: All values are in constant 2010 $. Industrialization level classification is based on Annex C1, Table C1.2.
Source: UNIDO elaboration based on the Manufacturing Value Added 2017 database (UNIDO 2017f).

is Brazil, whose share among such economies fell from 14.9 percent in 1990 to 4.1 percent in 2016 (Figure 7.4).

World MVA has grown slightly faster than gross domestic product (GDP), strongly influenced by high MVA growth in developing and emerging industrial economies (Figure 7.5).

In industrialized economies the MVA share of GDP declined from 14.7 percent in 1991 to 13.9 percent in 2014 (Figure 7.6), thanks to the increasing importance of services. In developing and emerging industrial economies, the share climbed from 15.4 percent to 20.3 percent, thanks largely to the relocation of manufacturing production from industrialized economies to the developing world.

Regional trends

Europe was once the world's largest manufacturing region, accounting for 40.3 percent of MVA in 1990 and 33.4 percent in 2000. The Asia and Pacific region had overtaken it, increasing its share of MVA

Table 7.2
Average annual growth rate of manufacturing value added by industrialization level, development group, region and income, 1990–2016 (percent)

Grouping	1990–2000	2000–2016 (est.)
World	2.9	3.1
By industrialization level		
Industrialized economies	2.3	1.3
Developing and emerging industrial economies	5.0	6.5
Emerging industrial economies	5.5	6.7
Other developing economies	2.4	4.7
Least developed countries	0.2	7.1
By region (developing and emerging industrial economies)		
Africa	1.4	4.0
Asia and Pacific	4.6	5.9
Europe	1.0	1.3
Latin America	2.9	1.2
By income		
High income	2.3	1.4
Upper-middle income	5.9	6.7
Lower-middle income	3.6	6.1
Low income	–1.4	5.8

Note: Manufacturing value added is in constant 2010 $. Regional, industrialization and income level classifications are based on, respectively, Annex C1, Tables C1.1, C1.2 and C1.3.
Source: UNIDO elaboration based on the Manufacturing Value Added 2017 database (UNIDO 2017f).

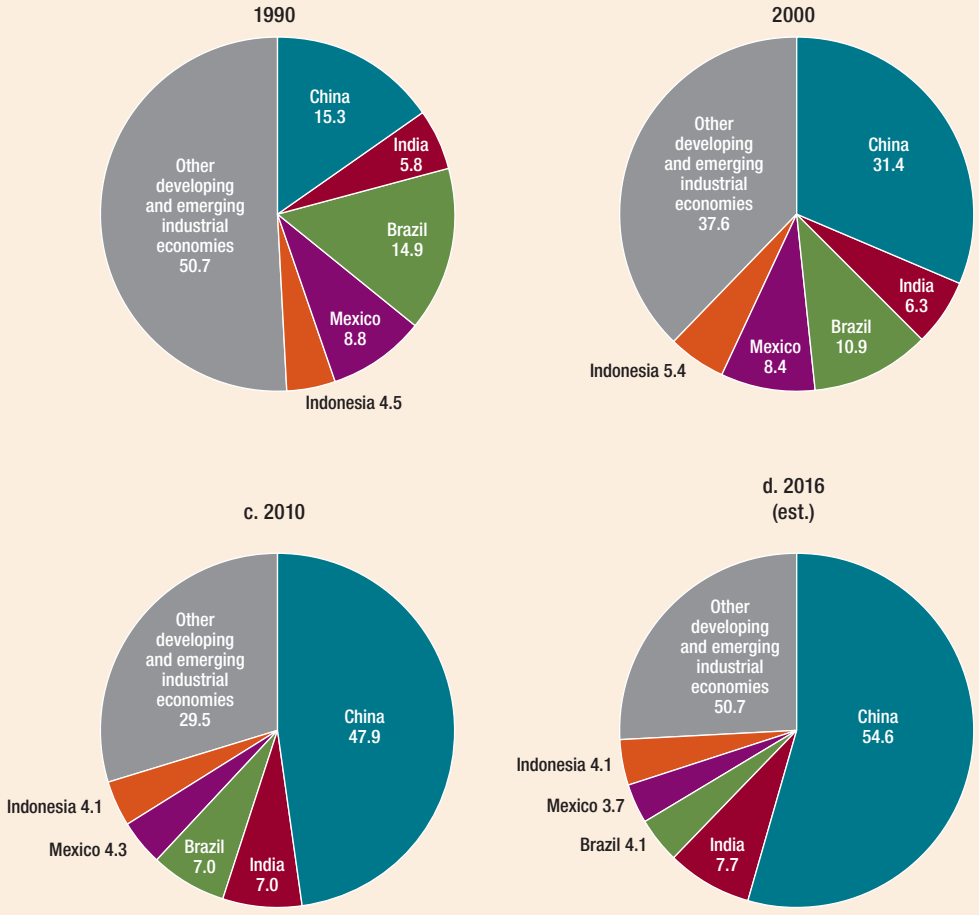
Table 7.3
Average annual growth rate of manufacturing value added in selected countries, 1990–2016 (percent)

Country	1990–2000	2000–2016 (est.)
Belarus	0.01	6.6
Brazil	1.8	0.3
Bulgaria	–4.5	4.2
China	12.8	10.3
India	5.9	7.9
Peru	3.6	4.5
Romania	–2.8	3.7

Note: Manufacturing value added is in constant 2010 $.
Source: UNIDO elaboration based on the Manufacturing Value Added 2017 database (UNIDO 2017f).

“Africa’s share of world MVA was 2 percent in 2016, and its share of MVA in GDP fell from 12.8 percent in 1990 to 10.5 percent in 2016

Figure 7.4
China is the largest manufacturing producer in developing and emerging industrial economies (percent of country group’s manufacturing value added)



Note: All values are in constant 2010 $. Industrialization level classification is based on Annex C1, Table C1.2.
Source: UNIDO elaboration based on the Manufacturing Value Added 2017 database (UNIDO 2017f).

to 44.1 percent in 2010. Its share of MVA in 2016 is estimated at 49.5 percent (Figure 7.7).

Annual average MVA growth rate in the Asia and Pacific region climbed to almost 6 percent in 2000–2016 (see Table 7.2), driven largely by China.

Although Africa’s annual MVA growth rose from 1.4 percent in 1990–2000 to 4.0 percent in 2000–2016, its MVA remains very low (Figure 7.8). Africa’s share of world MVA was 2.0 percent in 2016, and its share of MVA in GDP fell from 12.8 percent in 1990 to 10.5 percent in 2016.

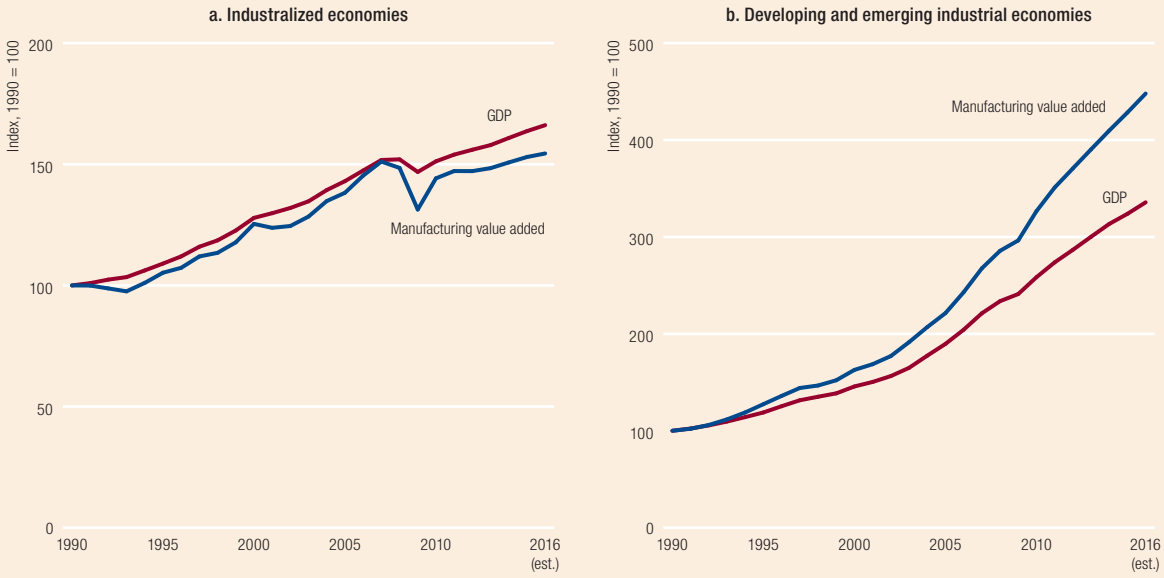
Annual average MVA growth in Latin America slowed from 2.9 percent in 1990–2000 to 1.2 percent in 2000–2016, and its global MVA share decreased from 8.3 percent in 2000 to 6.2 percent in 2016. High growth rates in Argentina, Chile and Peru are the main drivers of the region’s MVA growth.

Manufacturing value added per capita

Contrary to popular perception, the absolute value of manufacturing production and MVA per capita increased in all country groups (including industrialized economies) between 1990 and 2016 (Figure 7.9). And despite faster average annual growth of MVA per capita in developing and emerging industrial economies, MVA per capita in industrialized economies

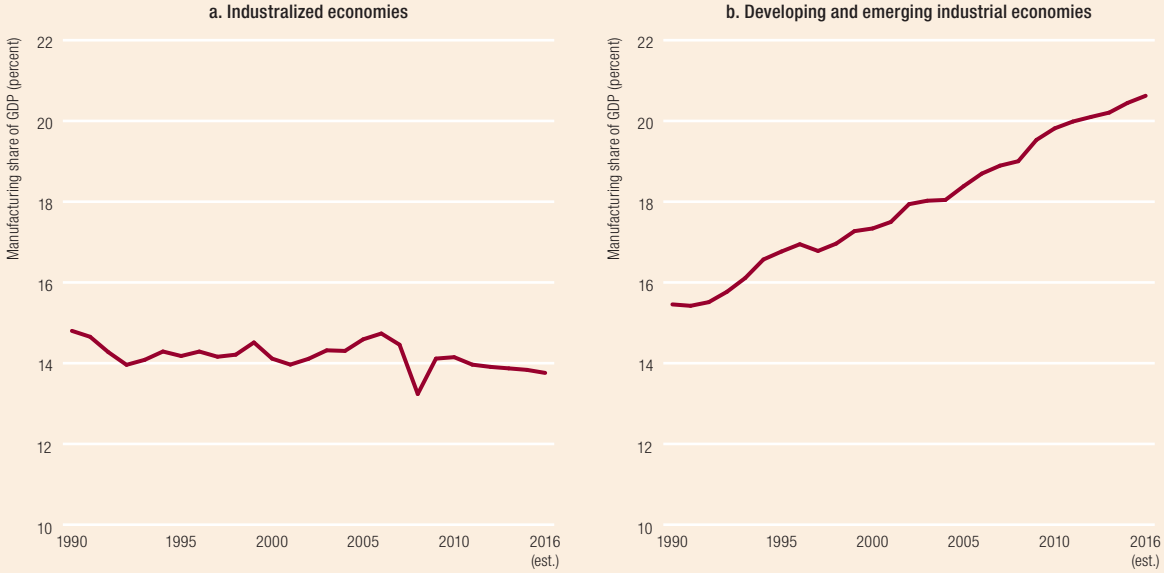
“Contrary to popular perception, the absolute value of manufacturing production and MVA per capita increased in all country groups between 1990 and 2016

Figure 7.5
A shift of manufacturing production from industrialized economies to developing and emerging industrial economies



Note: All values are in constant 2010 $. GDP is gross domestic product. Industrialization level classification is based on Annex C1, Table C1.2.
Source: UNIDO elaboration based on the Manufacturing Value Added 2017 database (UNIDO 2017f).

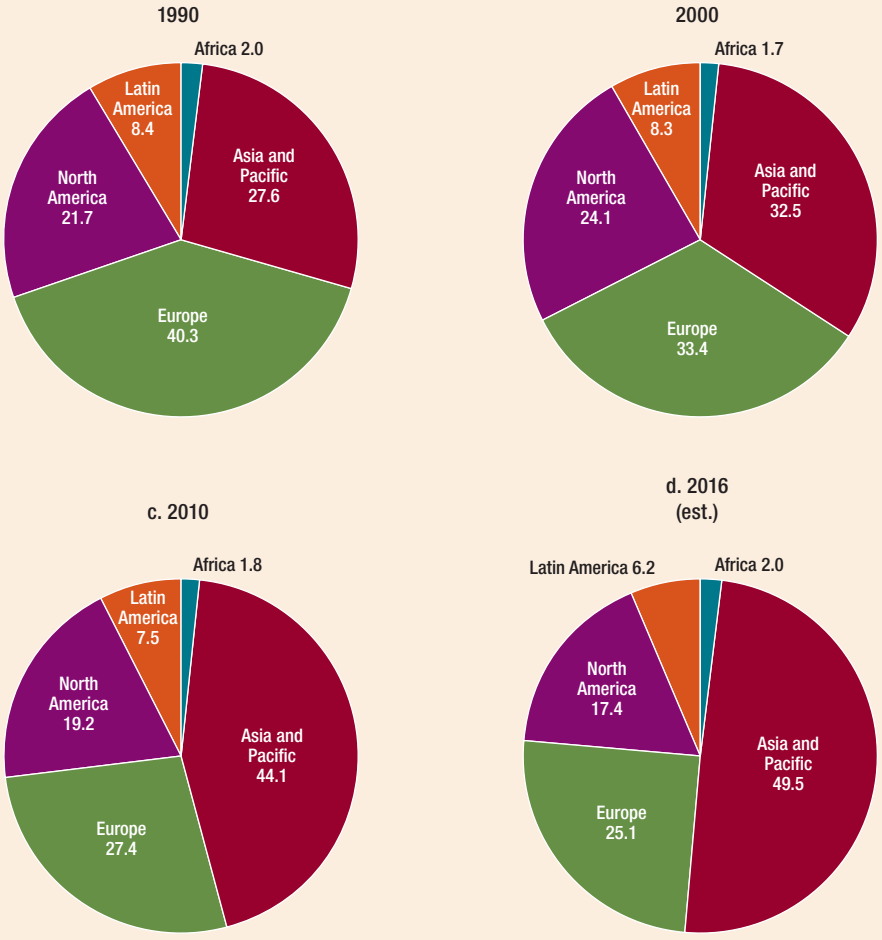
Figure 7.6
The importance of manufacturing industries is increasing in developing and emerging industrial economies compared with a declining trend in industrialized economies



Note: GDP is gross domestic product and is in constant 2010 $. Industrialization level classification is based on Annex C1, Table C1.2.
Source: UNIDO elaboration based on the Manufacturing Value Added 2017 database (UNIDO 2017f).

> **“The sharpest increase in global MVA share was in computer, electronic and optical products, from 6.8 percent in 2005 to 8.5 percent in 2015**

Figure 7.7
The Asia and Pacific region covered almost half of global manufacturing production in 2016 (percent of global manufacturing value added)



Note: All values are in constant 2010 $. Regional classification is based on Annex C1, Table C1.1.
Source: UNIDO elaboration based on the Manufacturing Value Added 2017 database (UNIDO 2017f).

remains many times higher. Average annual MVA in industrialized economies rose 7.2 percent between 2010 and 2016, and MVA per capita increased 4.3 percent.

Sectoral composition of manufacturing value added

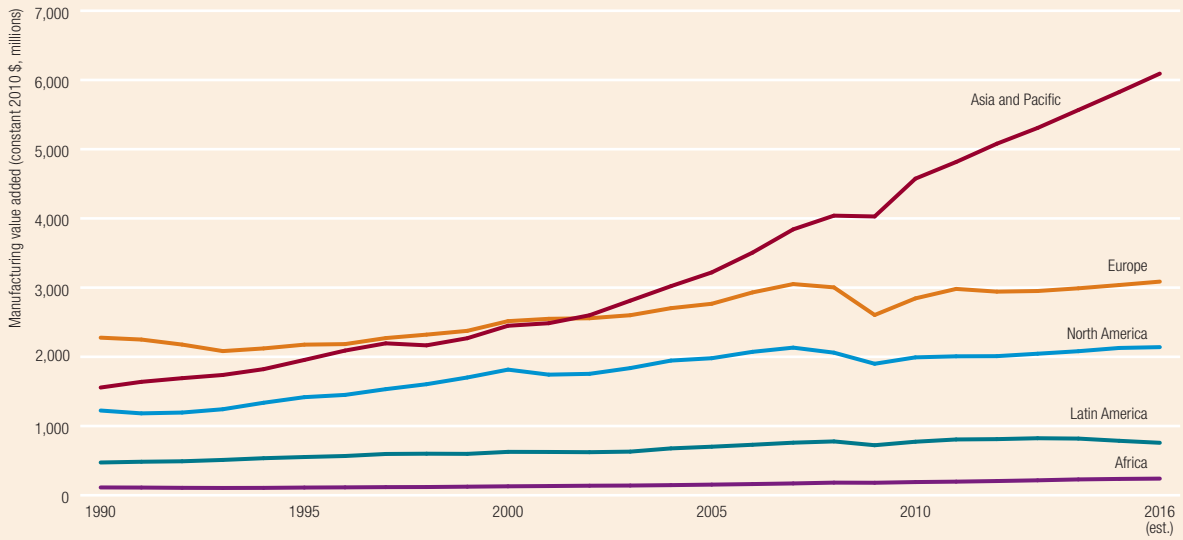
The leading global manufacturing industries in 2015 were food products and beverages (13.9 percent of total); chemicals and chemical products (12.6 percent); computer, electronic and optical products (8.5 percent); machinery and equipment not elsewhere classified (8.2 percent); and motor vehicles, trailers and semi-trailers (8.1 percent) (Table 7.4).

The sharpest increase in global MVA share was in computer, electronic and optical products, the share of which grew from 6.8 percent in 2005 to 8.5 percent in 2015. Three low-tech industries lost shares: wood and products of wood and cork, printing and reproduction of recorded media and furniture.

Industrialized economies still dominate world MVA, largely through the manufacturing of medium-high and high-tech products. Developing and emerging industrial economies produce largely basic

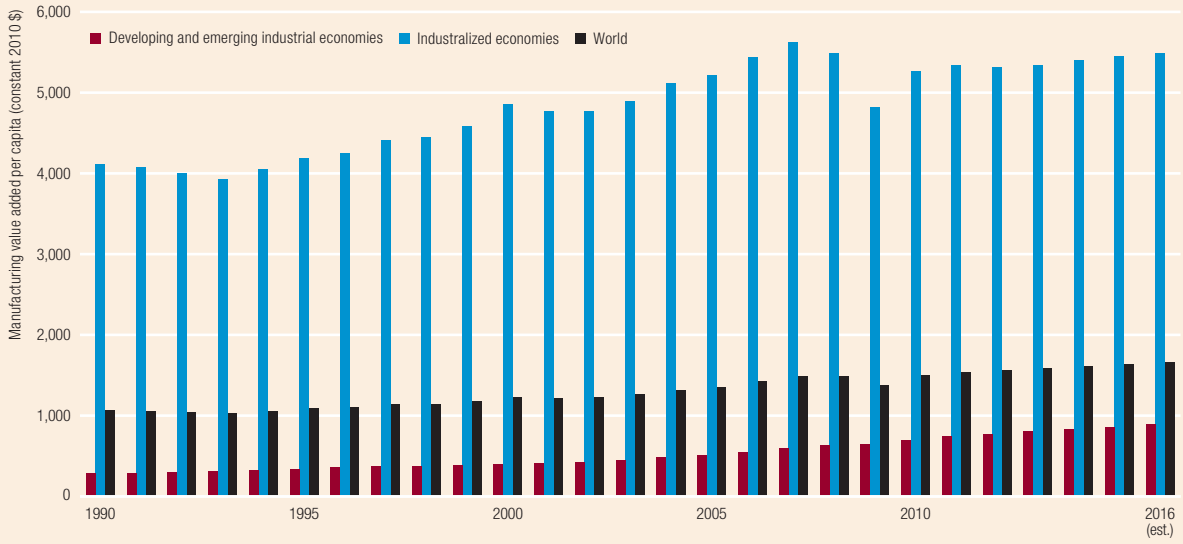
“The Asia and Pacific region has dominated global manufacturing production since 2002

Figure 7.8
The Asia and Pacific region has dominated global manufacturing production since 2002



Note: All values are in constant 2010 $. Regional classification is based on Annex C1, Table C1.1.
Source: UNIDO elaboration based on the Manufacturing Value Added 2017 database (UNIDO 2017f).

Figure 7.9
Manufacturing value added per capita in industrialized economies is multi-fold higher than in developing and emerging economies



Note: Industrialization level classification is based on Annex C1, Table C1.2.
Source: UNIDO elaboration based on the Manufacturing Value Added 2017 database (UNIDO 2017f).

“By 2015 industrialized economies had lost their dominance in various manufacturing subsectors

Table 7.4
Share of manufacturing value added by industry group, industrialization level and worldwide, 2000, 2005 and 2015 (percent)

	Industrialized economies			Developing and emerging industrial economies			World		
Subsector	2005	2010	2015	2005	2010	2015	2005	2010	2015
Manufacture of food products and beverages	12.3	13.0	12.8	16.7	15.8	15.6	13.5	14.0	13.9
Manufacture of tobacco products	0.9	0.8	0.6	2.3	2.2	2.1	1.3	1.3	1.3
Manufacture of textiles	1.7	1.2	1.1	4.6	4.3	4.1	2.5	2.3	2.4
Manufacture of wearing apparel; dressing and dyeing of fur	1.2	0.9	0.7	3.4	3.1	3.0	1.8	1.7	1.6
Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear	0.5	0.4	0.4	1.3	1.2	1.1	0.7	0.7	0.7
Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	2.1	1.7	1.6	1.6	1.3	1.3	2.0	1.5	1.5
Manufacture of paper and paper products	3.1	2.9	2.8	2.8	2.7	2.6	3.0	2.9	2.7
Publishing, printing and reproduction of recorded media	2.5	2.3	2.0	1.2	1.1	1.0	2.1	1.9	1.6
Manufacture of coke, refined petroleum products and nuclear fuel	3.2	3.4	3.4	7.2	5.9	4.9	4.3	4.3	4.0
Manufacture of chemicals and chemical products	12.6	13.3	13.0	11.1	11.4	12.1	12.2	12.6	12.6
Manufacture of rubber and plastics products	4.9	4.7	4.7	4.0	3.8	3.6	4.7	4.4	4.3
Manufacture of other non-metallic mineral products	4.0	3.4	3.3	5.2	5.5	5.5	4.3	4.1	4.2
Manufacture of basic metals	4.9	4.9	4.6	9.8	10.1	10.7	6.3	6.7	7.1
Manufacture of fabricated metal products, except machinery and equipment	8.5	7.9	8.0	4.6	4.6	4.8	7.5	6.7	6.7
Manufacture of machinery and equipment n.e.c.	9.7	9.4	9.8	4.7	5.8	5.8	8.3	8.1	8.2
Manufacture of computer, electronic and optical products	7.5	9.5	9.8	5.1	5.9	6.7	6.8	8.2	8.5
Manufacture of electrical machinery and apparatus n.e.c.	4.3	4.3	4.0	3.4	4.0	4.1	4.1	4.2	4.1
Manufacture of motor vehicles, trailers and semi-trailers	8.5	8.0	9.1	6.4	6.9	6.8	7.9	7.6	8.1
Manufacture of other transport equipment	3.3	3.9	4.1	2.1	2.1	1.9	2.9	3.3	3.2
Manufacture of furniture; manufacturing n.e.c.	4.3	4.1	4.1	2.5	2.3	2.3	3.8	3.5	3.3
Total manufacturing	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note: Manufacturing value added is in constant 2010 $. ISIC is International Standard Classification and n.e.c. is not elsewhere classified. Manufacture of computer, electronic and optical products includes ISIC Rev. 3 codes 30, 32 and 33. Industrialization level and industry group classifications are based on, respectively, Annex C1, Table C1.2 and Annex C2, Table C2.1.
Source: UNIDO elaboration based on the INDSTAT2 ISIC, Rev. 3. database (UNIDO 2017d).

consumer goods, although their shares of medium-high and high-tech products increased sharply between 2005 and 2015.

In 2005 industrialized economies were the leader in all manufacturing industries except textiles, wearing apparel, and leather (Table 7.5). By 2015, industrialized economies had lost their dominance in various manufacturing subsectors, including tobacco, coke and refined petroleum products, non-metallic mineral products and basic metals. During this period, MVA grew more slowly in industrialized economies than in developing and emerging industrial economies, and most growth took place in medium-high and high-tech sectors. Developing and emerging industrial economies became the main producers of low- and medium-tech products, such as most basic consumer goods and basic metals.

Among developing and emerging industrial economies, China dominated manufacturing in all sectors in 2015, followed by India, Brazil, Indonesia and Mexico. It led in most manufacturing subsectors.

“Medium-high and high-tech products continue to dominate manufacturing production in industrialized economies

Table 7.5
Share of manufacturing value added by industry group and industrialization level, 2005, 2010 and 2015 (percent)

	Industrialized economies			Developing and emerging industrial economies		
Subsector	2005	2010	2015	2005	2010	2015
Manufacture of food products and beverages	65.8	59.5	53.7	34.2	40.5	46.3
Manufacture of tobacco products	52.0	38.7	29.2	48.0	61.3	70.8
Manufacture of textiles	49.0	33.7	27.5	51.0	66.3	72.5
Manufacture of wearing apparel; dressing and dyeing of fur	47.8	34.1	25.4	52.2	65.9	74.6
Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear	50.0	37.1	30.3	50.0	62.9	69.7
Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	77.4	69.5	64.0	22.6	30.5	36.0
Manufacture of paper and paper products	74.4	65.7	59.8	25.6	34.3	40.2
Publishing, printing and reproduction of recorded media	84.7	79.5	73.6	15.3	20.5	26.4
Manufacture of coke, refined petroleum products and nuclear fuel	53.6	50.6	49.7	46.4	49.4	50.3
Manufacture of chemicals and chemical products	74.8	67.5	60.2	25.2	32.5	39.8
Manufacture of rubber and plastics products	76.4	68.5	64.7	23.6	31.5	35.3
Manufacture of other non-metallic mineral products	66.6	52.6	45.7	33.4	47.4	54.3
Manufacture of basic metals	56.6	46.4	38.1	43.4	53.6	61.9
Manufacture of fabricated metal products, except machinery and equipment	82.8	75.5	70.5	17.2	24.5	29.5
Manufacture of machinery and equipment n.e.c.	84.3	74.2	70.8	15.7	25.8	29.2
Manufacture of computer, electronic and optical products	79.1	74.0	67.5	20.9	26.0	32.5
Manufacture of electrical machinery and apparatus n.e.c.	76.6	65.9	58.4	23.4	34.1	41.6
Manufacture of motor vehicles, trailers and semi-trailers	77.7	67.4	65.5	22.3	32.6	34.5
Manufacture of other transport equipment	80.7	77.4	75.5	19.3	22.6	24.5
Manufacture of furniture; manufacturing n.e.c.	81.6	76.1	71.5	18.4	23.9	28.5
Total manufacturing	72.3	64.1	58.6	27.7	35.9	41.4

Note: Manufacturing value added is in constant 2010 $. ISIC is International Standard Classification and n.e.c. is not elsewhere classified. Manufacture of computer, electronic and optical products includes ISIC Rev. 3 codes 30,32 and 33. Industrialization level and industry group classifications are based on, respectively, Annex C1, Table C1.2 and Annex C2, Table C2.1.
Source: UNIDO elaboration based on the INDSTAT2 ISIC, Rev. 3. database (UNIDO 2017d).

Technology composition of manufacturing value added

The best evidence of the change in the structure of manufacturing is the shift of industries from resource-based and low-tech activities to medium-high and high-tech activities. An increase in the share of medium-high and high-tech industries in total MVA indicates the country's technological intensity in manufacturing and its capacity to introduce new technology in other sectors. These industries produce the machinery and equipment required by manufacturing, agriculture (particularly livestock), mining and construction and a range of consumer goods. In 2015 medium-high and high-tech sectors accounted for 44.7 percent of MVA (Table 7.6).

Medium-high and high-tech products continue to dominate manufacturing production in industrialized economies, although their share of global MVA from these products fell from 78.5 percent in 2005 to 65.4 percent in 2015 (Figure 7.10). In developing economies, MVA in these subsectors more than doubled between 2005 and 2015, and their share of global MVA from them rose from 21.5 percent to 34.6 percent.

> **“Manufacturing has played a crucial role in job creation, by absorbing surplus labour from traditional sectors and directing it into higher-paying activities**

Table 7.6
Technology intensity composition of manufacturing value added by industrialization level, development group, region and income, 2005, 2010 and 2015 (percent)

Grouping	2005			2010			2015		
	Low tech	Medium-low tech	Medium-high and high tech	Low tech	Medium-low tech	Medium-high and high tech	Low tech	Medium-low tech	Medium-high and high tech
World	30.8	27.0	42.2	29.8	26.3	43.9	29.0	26.3	44.7
By industrialization level									
Industrialized economies	28.6	25.6	45.8	27.4	24.3	48.3	26.1	24.1	49.9
North America	32.8	24.2	43.0	30.9	22.9	46.2	28.7	23.0	48.3
Europe	28.4	27.1	44.4	27.9	25.7	46.4	26.4	25.1	48.5
East Asia	22.1	23.8	54.1	21.2	22.4	56.5	20.8	22.1	57.1
Developing and emerging industrial economies	36.4	30.8	32.8	34.0	29.9	36.1	33.2	29.5	37.3
Emerging industrial economies	35.0	30.8	34.2	32.6	29.7	37.7	31.4	29.9	38.8
Other developing economies	45.3	31.4	23.4	43.7	32.6	23.8	46.2	26.9	26.9
Least developed countries	61.4	25.9	12.7	70.2	20.8	9.0	73.3	19.4	7.3
By region (developing and emerging industrial economies)									
Africa	49.4	29.8	20.8	49.6	31.2	19.2	58.2	22.6	19.2
South Africa	42.4	29.9	27.8	43.9	28.6	27.5	44.5	26.8	28.7
Asia and Pacific	32.0	30.8	37.3	29.9	30.1	40.0	29.1	30.1	40.8
China	29.9	30.5	39.6	28.5	30.0	41.5	27.5	30.3	42.2
India	26.5	40.0	33.5	22.8	38.8	38.4	23.9	40.7	35.4
Europe	42.5	27.9	29.6	40.9	27.9	31.2	38.9	27.9	33.2
Poland	41.9	26.1	32.0	37.2	27.9	34.9	36.8	29.2	34.0
Turkey	41.2	27.2	31.6	40.6	27.4	32.0	38.2	26.9	35.0
Latin America	39.9	32.3	27.7	40.0	29.8	30.2	41.4	29.4	29.2
Mexico	33.0	33.7	33.3	34.0	30.9	35.1	32.1	28.1	39.9
By income									
High income	29.0	25.6	45.4	27.7	24.4	47.9	26.4	24.2	49.3
Upper-middle income	34.7	31.3	34.0	32.4	30.1	37.5	30.8	30.1	39.1
Lower-middle income	38.4	29.6	32.0	36.6	29.5	33.9	39.1	27.1	33.8
Low income	63.2	24.9	11.8	71.4	20.3	8.3	73.8	19.5	6.7

Note: Manufacturing value added is in constant 2010 $. Regional, industrialization, income level and technology classifications are based on, respectively, Annex C1, Table C1.1, C1.2, C1.3 and Annex C3, Table C3.2 (in this table *Building and repairing of ships and boats* is classified as medium-high and high technology sector).
Source: UNIDO elaboration based on the INDSTAT2 ISIC, Rev. 3. database (UNIDO 2017d).

Trends in employment

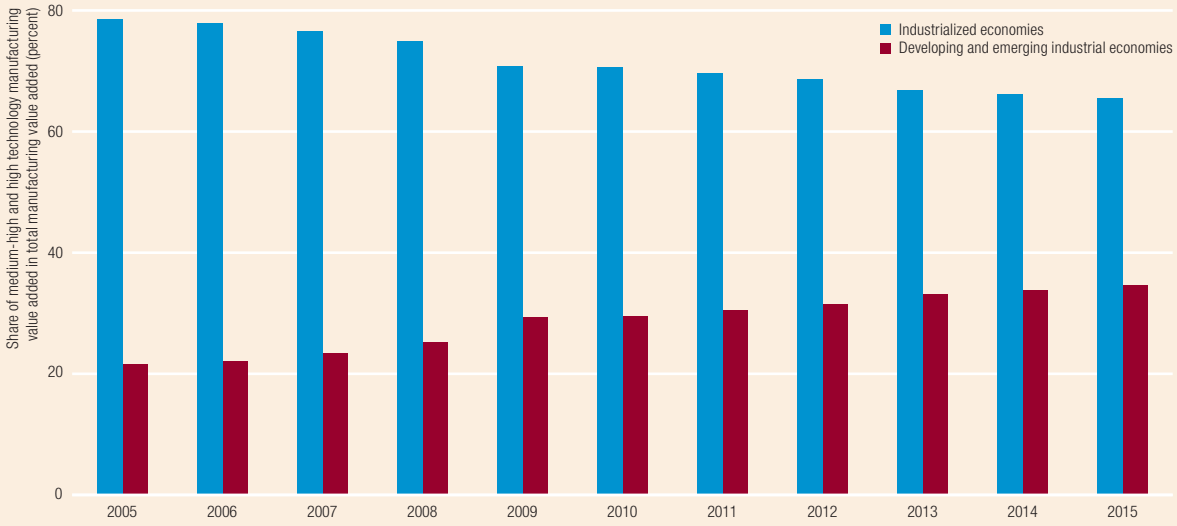
Manufacturing has played a crucial role in job creation, by absorbing surplus labour from agriculture and other traditional sectors and directing labour into higher-paying activities. Global manufacturing employment increased at an average annual rate of 0.4 percent between 1991 and 2016, reaching an estimated 361 million in 2016 (Figure 7.11). The contribution of manufacturing to total employment decreased, however, from 14.4 percent to 11.1 percent in 2016.

Industrialized economies

As industrialized economies shifted to technology innovation, the number of manufacturing jobs fell,

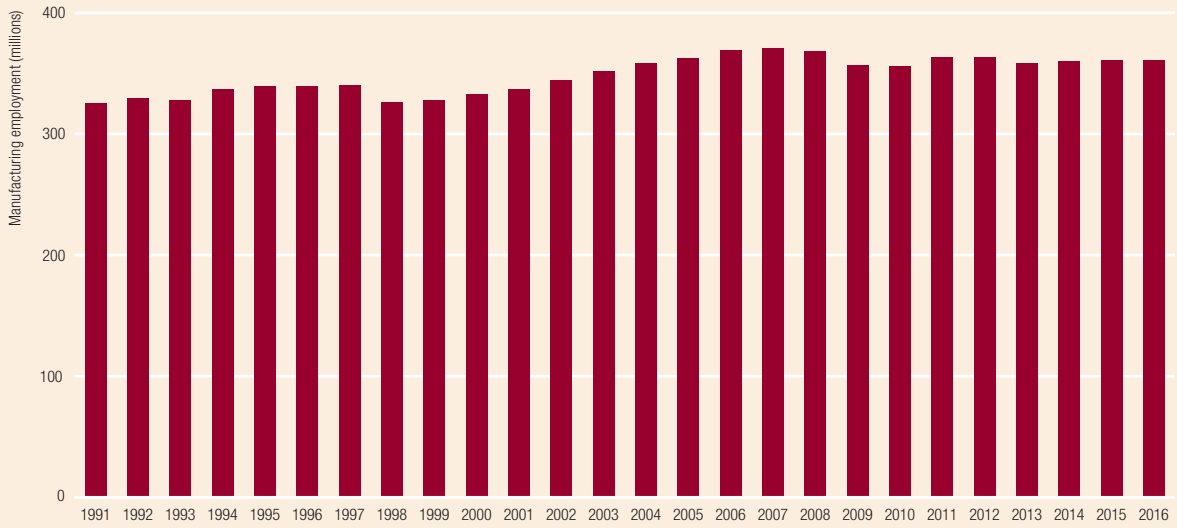
“Global manufacturing employment increased at an average annual rate of 0.4 percent between 1991 and 2016, reaching an estimated 361 million in 2016

Figure 7.10
Industrialized economies continue to dominate global medium-high and high-tech manufacturing production



Note: All values are in constant 2010 $. Industrialization level and technology classifications are based on, respectively, Annex C1, Table C1.2 and Annex C3, Table C3.2 (specific to this figure is the classification of Building and repairing of ships and boats within the medium-high and high technology sector).
Source: UNIDO elaboration based on the INDSTAT2 ISIC, Rev. 3. database (UNIDO 2017d).

Figure 7.11
A slightly increasing trend in world manufacturing employment



Source: UNIDO elaboration based on the databases Key Indicators of the Labour Market (2013 and 2015) and Trends Econometric Models (ILO 2016).

"The number of people in developing and emerging industrial economies employed in manufacturing rose from 215 million in 1991 to 279 million in 2016

from 107 million in 1991 to 78 million in 2016, reducing the share of total employment from 21.7 percent to 13.2 percent (Figure 7.12). This decline was much steeper than the global decline.

Manufacturing employment in industrialized economies accounted for almost 5 percent of global employment in 1991 but just 2.2 percent in 2016. Notable job shedders included all five of the top industrialized economy manufactures (the United States, Japan, Germany, the Republic of Korea and Italy). Although the United States has the largest number of manufacturing jobs among the five (Figure 7.13), its 2016 share of manufacturing jobs in total employment was the lowest (9.6 percent). Germany had the largest share (19.2 percent). Among other industrialized economies, the countries with the largest shares of manufacturing employment in total employment were Czechia (25.8 percent), Slovakia (22.3 percent) and Slovenia (21.3 percent).

Developing and emerging industrial economies

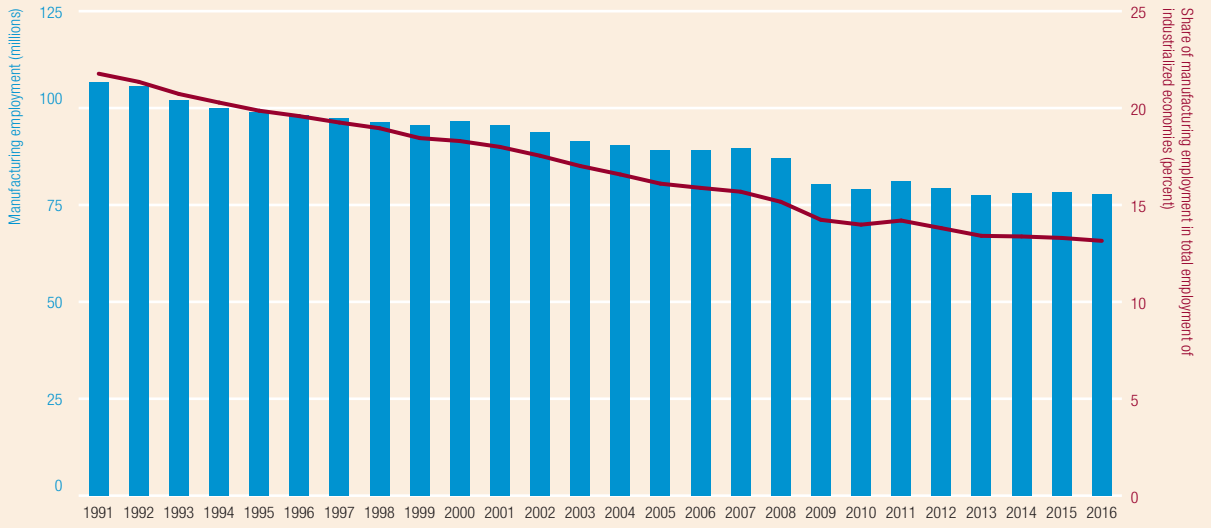
The number of people in developing and emerging industrial economies employed in manufacturing rose from 215 million in 1991 to 279 million in 2016. The share in total employment slipped, however, from 12.4 percent to 10.5 percent (Figure 7.14). In 2016 manufacturing employment in developing and emerging industrial economies accounted for 8.5 percent of total global employment.

China dominates employment in this group of countries (Figure 7.15), employing about 80 million people in 2016—about the same number employed in industrialized economies. In 2016 the five major developing economies—China, India, Brazil, Indonesia and Mexico—accounted for 63.2 percent of manufacturing jobs in developing and emerging industrial economies and 5.4 percent of total global employment.

Manufacturing's share of total national employment in China dropped from 13.9 percent in 1991 to 10.4 percent in 2016. The share is the lowest among the top five developing and emerging industrial economies.

Manufacturing employment in Indonesia grew by an average rate of 3.4 percent a year between 1991 and 2016. In 2010 it overtook Brazil in terms of the

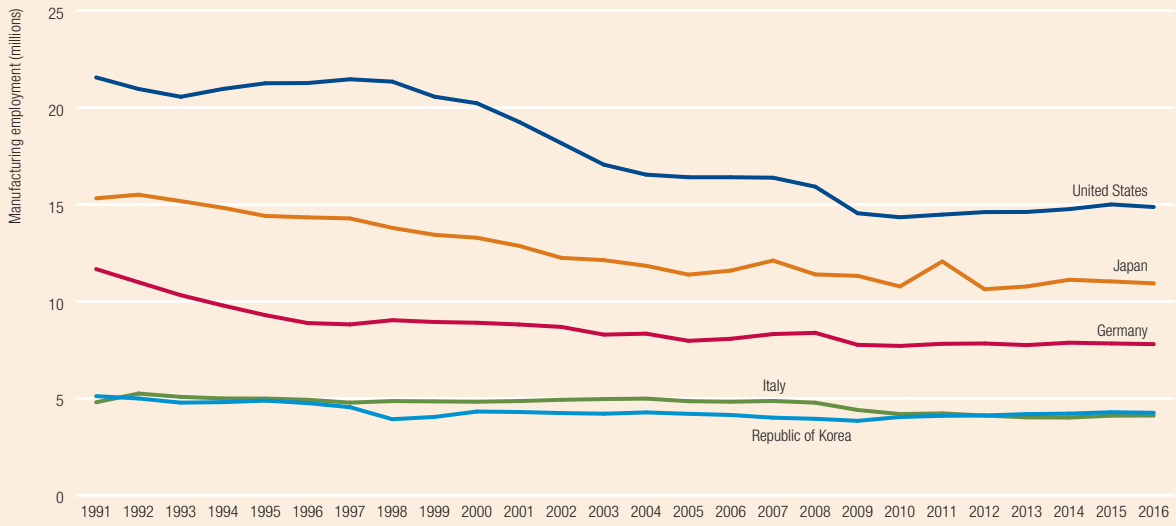
Figure 7.12
The total number of jobs in manufacturing is decreasing in industrialized economies



Note: Industrialization level classification is based on Annex C1, Table C1.2.
Source: UNIDO elaboration based on the databases Key Indicators of the Labour Market (2013 and 2015) and Trends Econometric Models (ILO 2016).

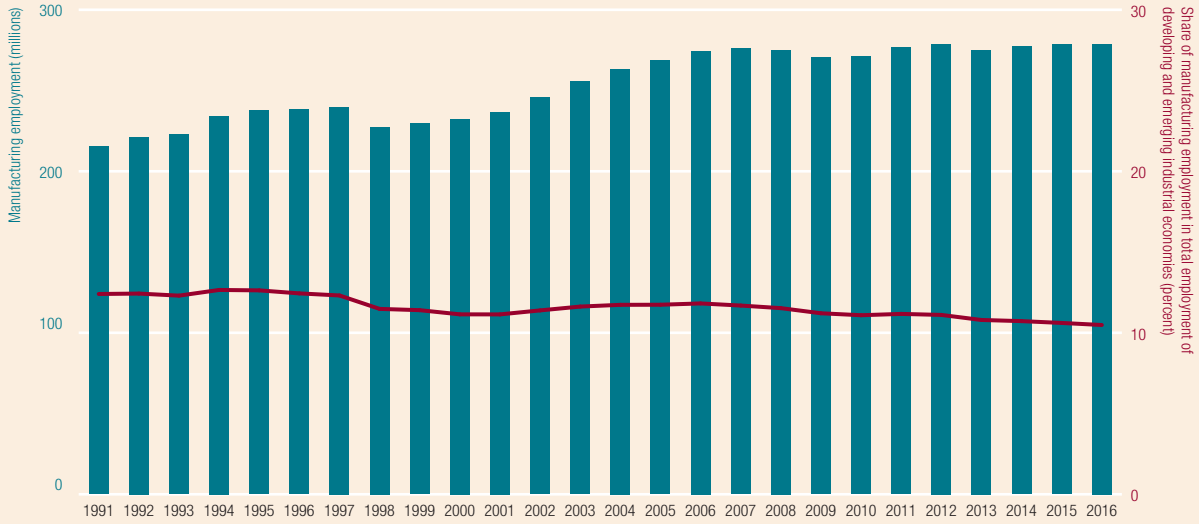
“In 2016 manufacturing employment in developing and emerging industrial economies accounted for 8.5 percent of total global employment

Figure 7.13
The major industrialized economies have seen manufacturing employment shrink



Note: Industrialization level classification is based on Annex C1, Table C1.2.
Source: UNIDO elaboration based on the databases Key Indicators of the Labour Market (2013 and 2015) and Trends Econometric Models (ILO 2016).

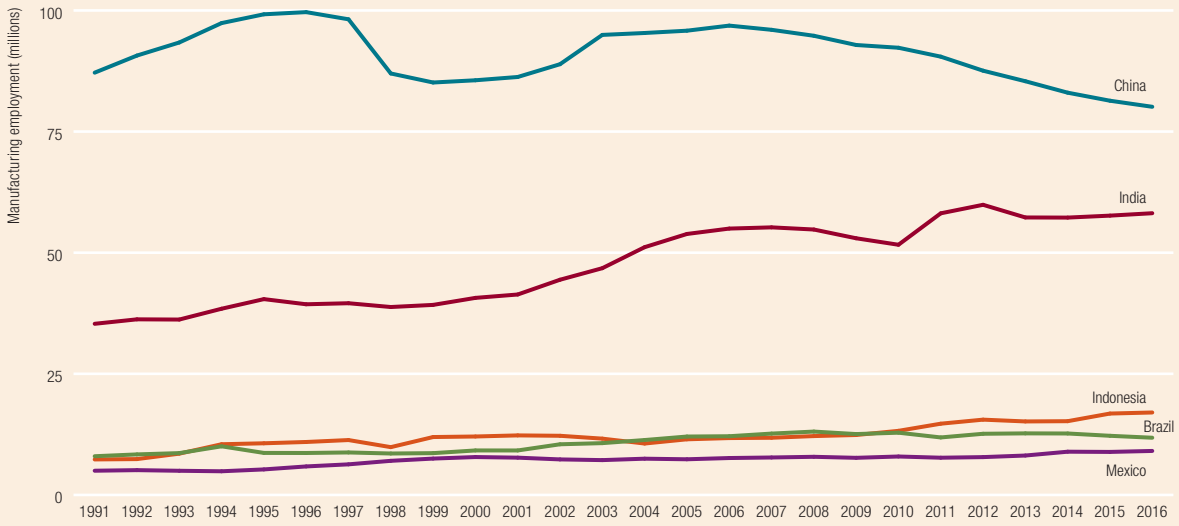
Figure 7.14
The share of manufacturing employment in total employment diminished in developing and emerging industrial economies against an increasing number of jobs



Note: Industrialization level classification is based on Annex C1, Table C1.2.
Source: UNIDO elaboration based on the databases Key Indicators of the Labour Market (2013 and 2015) and Trends Econometric Models (ILO 2016).

“In 2016 the largest shares of manufacturing jobs in total employment in developing and emerging industrial economies were in Belarus and Bulgaria

Figure 7.15
Manufacturing employment in developing and emerging industrial economies is highly dominated by China



Note: Industrialization level classification is based on Annex C1, Table C1.2.
Source: UNIDO elaboration based on the databases Key Indicators of the Labour Market (2013 and 2015) and Trends Econometric Models (ILO 2016).

number of manufacturing jobs. Manufacturing's share of total employment in Indonesia rose from 10.3 percent in 1991 to 14.2 percent in 2016. Despite an increasing number of manufacturing jobs in India, the share of manufacturing in total employment increased only slightly—from 10.9 percent in 1991 to 11.8 percent in 2016. In 2016 the largest shares of manufacturing jobs in total employment in developing and emerging industrial economies were in Belarus (21.6 percent), Bulgaria (19.0 percent) and Poland (18.5 percent).

Trends in value added per worker

Real value added per worker in manufacturing is higher than real GDP per worker, and the difference has been increasing. This global trend is also evident in countries at different stages of industrial development.

In most developing and emerging industrial economies, labour productivity in 1991–2014 was higher in manufacturing than in the overall economy. In contrast, in industrialized economies, real value added per worker was lower in manufacturing than for the overall economy, although manufacturing productivity increased after the global financial crisis, rising at about the same rate as in developing and emerging industrial economies (Figure 7.16).

Trends in prices

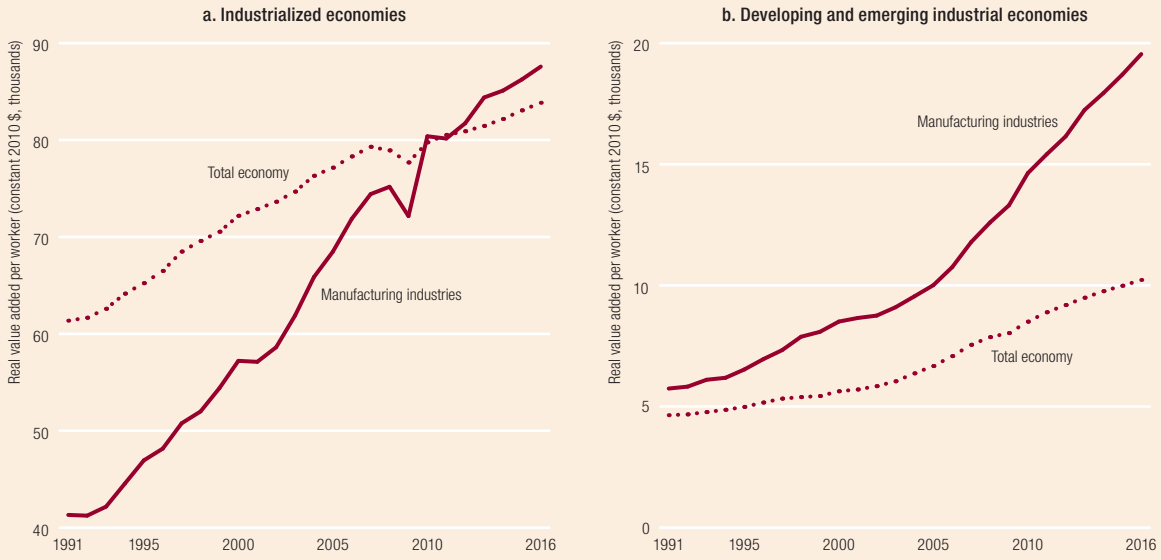
The relative prices of manufactured goods declined between 1991 and 2016 (Figure 7.17). The drop in prices was more extensive in developing and emerging industrial economies than in industrialized economies where relative prices of manufactured goods stabilized after the global financial crisis.

Trends in exports

Manufactured exports suffered a sharp decline in 2009 for all country groups. Export growth resumed after 2009, particularly in developing and emerging industrial economies. World manufactured exports peaked at $14,230 billion in 2014, before falling 9.7 percent to $12,854 billion in 2015 (Table 7.7). Exports dropped in all major economies, as a result of declines in commodity prices and exchange rates. China, the world's largest exporter of manufactured goods, saw its economic growth decelerate.

“Manufactured exports suffered a sharp decline in 2009 for all country groups. After 2009, export growth resumed particularly in developing countries

Figure 7.16
Labour productivity in manufacturing is higher in industrialized economies than in developing and emerging economies



Note: Industrialization level classification is based on Annex C1, Table C1.2.
Source: UNIDO elaboration based on the Manufacturing Value Added 2017 database (UNIDO 2017f) and on the databases Key Indicators of the Labour Market (2013 and 2015) and Trends Econometric Models (ILO 2016).

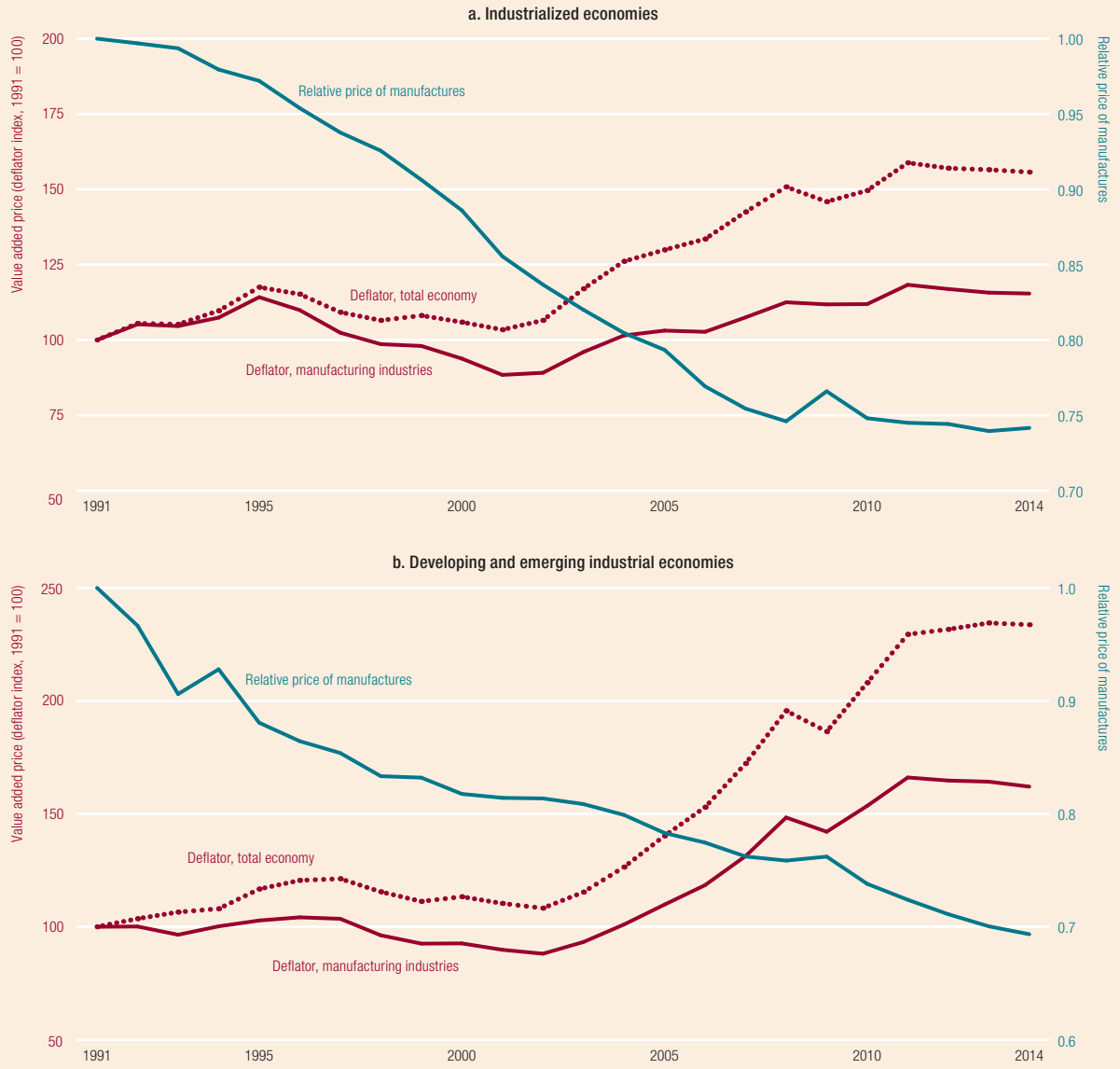
Table 7.7
World manufacturing exports by industrialization level, development group, region and income, selected years, 1996–2015 (current $, billions)

Grouping	1996	2000	2005	2010	2015
World	3,648.0	5,033.0	8,125.0	11,441.0	12,854.0
By industrialization level					
Industrialized economies	3,277.0	4,187.0	6,208.0	7,938.0	8,395.0
Developing and emerging industrial economies	370.0	845.0	1,916.0	3,503.0	4,459.0
Emerging industrial economies	366.0	754.0	1,715.0	3,131.0	4,025.0
Other developing economies	3.0	85.0	176.0	326.0	371.0
Least developed countries	1.0	6.0	25.0	46.0	63.0
By region (developing and emerging industrial economies)					
Africa	2.0	38.0	91.0	190.0	145.0
Asia and Pacific	200.0	459.0	1,148.0	2,293.0	3,168.0
Europe	57.0	93.0	269.0	441.0	514.0
Latin America	111.0	255.0	409.0	579.0	632.0
By income					
High income	3,309.0	4,111.0	6,131.0	7,848.0	8,328.0
Upper-middle income	278.0	773.0	1,676.0	2,995.0	3,783.0
Lower-middle income	61.0	143.0	296.0	557.0	688.0
Low income	1.0	5.0	21.0	41.0	55.0

Note: Regional, industrialization and income level classifications are based on, respectively, Annex C1, Tables C1.1, C1.2 and C1.3.
Source: UNIDO elaboration based on the United Nations Comtrade database (UNSD 2017).

“Global manufactured exports grew 6.5 percent in 2000–2015, much faster than MVA and GDP

Figure 7.17
Manufacturing industries tend to show a more persistent decline in relative prices than the overall economy



Note: Industrialization level classification is based on Annex C1, Table C1.2.
Source: UNIDO elaboration based on the Manufacturing Value Added 2017 database (UNIDO 2017f).

Global manufactured exports grew 6.5 percent in 2000–2015, much faster than MVA and GDP, driven mainly by higher exports from developing and emerging industrial economies (Table 7.8). Global manufacturing exports accounted for 88.6 percent of global merchandise exports in 2015; exports from mining accounted for 8.0 percent and agricultural exports for 3.2 percent.

Manufactured exports from industrialized economies reached $8,395 billion in 2015, after growing at an average annual rate of 4.8 percent in 2000–2015. Manufactured exports from developing and emerging industrial economies grew at an average annual rate of 11.7 percent to $4,459 billion, more than five times their value in 2000.

“Developing and emerging industrial economies increased their share of manufacturing exports from 16.8 percent in 2000 to 34.7 percent in 2015

Table 7.8
Average annual growth rate of manufactured exports by industrialization level, development group, region and income, 2000–2015 (percent)

Grouping	2000–2015
World	6.5
By industrialization level	
Industrialized economies	4.8
Developing and emerging industrial economies	11.7
Emerging industrial economies	11.8
Other developing economies	10.4
Least developed countries	16.6
By region (world)	
Asia and Pacific	13.7
Europe	12.1
Latin America	6.2
Africa	9.3
By income (world)	
High income	4.8
Upper-middle income	11.2
Lower-middle income	11.0
Low income	16.8

Note: Manufacturing exports are in current $. Regional, industrialization and income level classifications are based on, respectively, Annex C1, Tables C1.1, C1.2 and C1.3.
Source: UNIDO elaboration based on the United Nations Comtrade database (UNSD 2017).

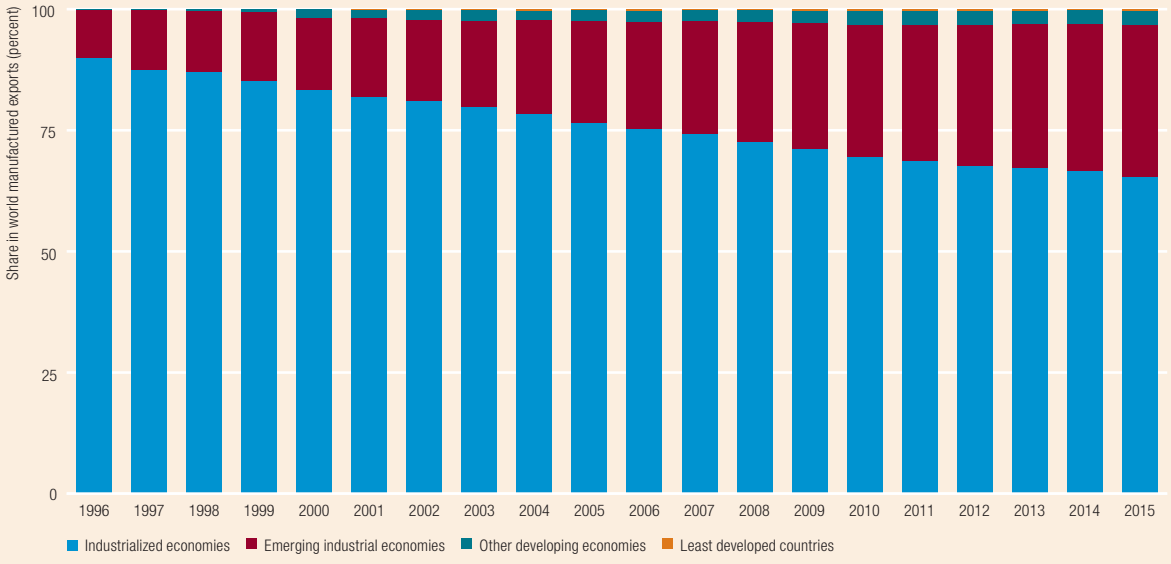
Developing and emerging industrial economies increased their share of manufacturing exports from 16.8 percent in 2000 to 34.7 percent in 2015 (Figure 7.18). The largest contributors were China, Mexico and India, which together accounted for 71.0 percent of total manufactured exports in this country group in 2015.

Globally, most manufactured exports are medium-high and high-tech products, such as chemicals, machinery and equipment, communications equipment and motor vehicles. They accounted for 60.0 percent of all manufactured exports in 2015 (Figure 7.19). Exports of these goods by developing and emerging industrial economies increased by 12.6 percent a year between 2000 and 2015, raising their contribution to world exports of these goods from 12.0 percent in 2000 to 30.0 percent in 2015.

Manufactured exports per capita

Manufactured exports per capita reflect a country’s ability to produce goods competitively and keep up with technological changes. Globally, this figure rose

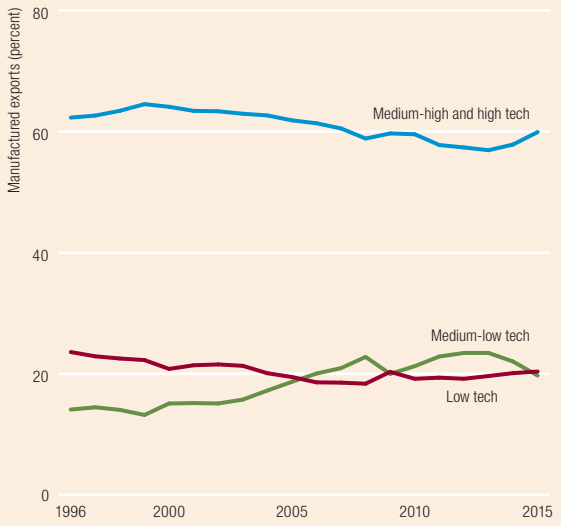
Figure 7.18
The structure of global manufacturing exports dominated by industrialized economies



Note: All values are in current $. Industrialization level classification is based on Annex C1, Table C1.2.
Source: UNIDO elaboration based on based on the United Nations Comtrade database (UNSD 2017).

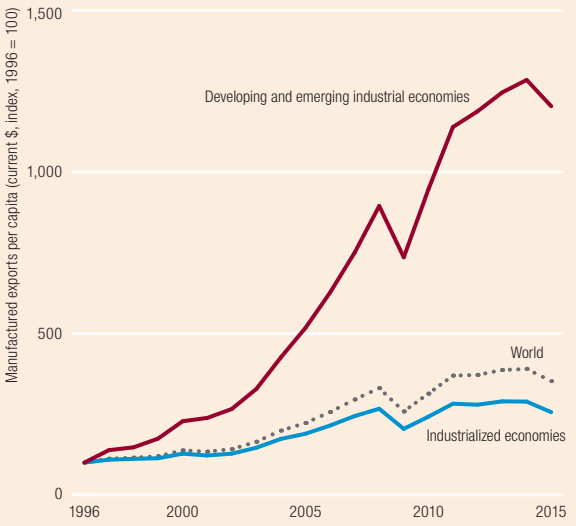
“China’s exports of manufactured goods grew much faster than the global rate

Figure 7.19
Medium-high and high-tech products continue to dominate global manufactured exports



Note: All values are in current $. Technology classification is based on Annex C3, Table C3.2 (in this figure Building and repairing of ships and boats is classified as medium-high and high technology sector).
Source: UNIDO elaboration based on based on the United Nations Comtrade database (UNSD 2017).

Figure 7.20
Growth trends in manufactured exports per capita



Note: Industrialization level classification is based on Annex C1, Table C1.2.
Source: UNIDO elaboration based on based on the United Nations Comtrade database (UNSD 2017) and the Manufacturing Value Added 2017 database (UNIDO 2017f).

to $1,969 in 2013, driven by industrialized economies. By 2015 it had fallen to $1,753 in 2015.

In developing and emerging industrial economies, the average annual growth rate of manufactured exports per capita was 10.2 percent in 2000–2015—almost 2.5 times as high as the 4.2 percent growth rate for industrialized economies (Figure 7.20). Per capita exports were still much lower ($732 against $6,778 in 2015).

Manufactured exports from developing and emerging industrial economies

China is the world’s largest exporter of manufactured goods. Its exports of manufactured goods grew at an average annual rate of 16 percent between 2000 and 2015 (to $2,249 billion)—much faster than the global rate of 6 percent. China’s share of developing and emerging industrial economies’ manufactured exports increased to 51 percent and its global share to 18 percent in 2015.

In 2015 the five largest exporters of manufactured goods among the developing and emerging industrial economies—China, Mexico, India, Thailand and Poland—accounted for 68 percent of the group’s total and 23 percent of the global total.

Asia and Pacific was the largest regional exporter in 2015, accounting for 71 percent of this group’s exports. The share of Latin American countries in the global total fell from 30 percent in 2000 to about 14 percent in 2015. Mexico was the largest exporter in the Latin American region, with a 54 percent regional share in 2015.

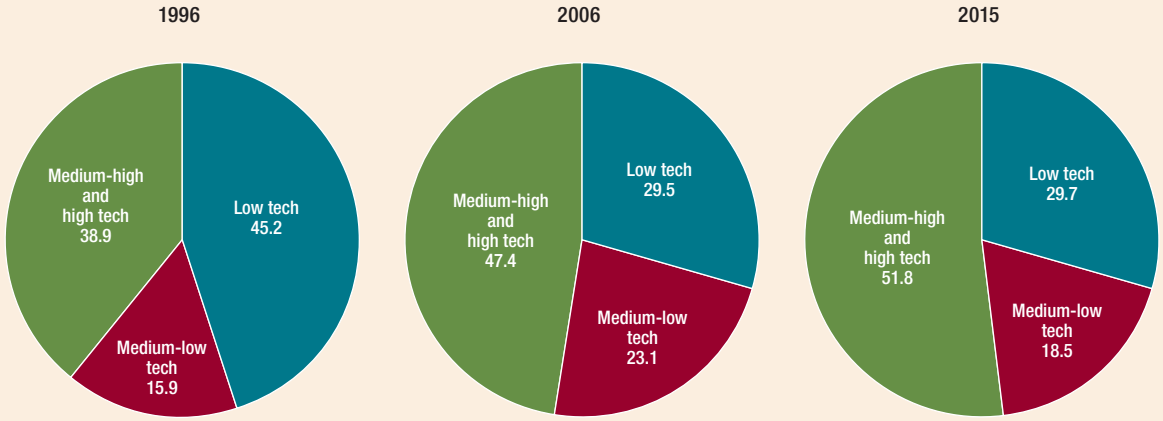
Europe’s share in developing and emerging industrial economies remained stable, at about 12 percent in 2015. The regional leader was Poland, which increased its group share to almost 4 percent.

Despite impressive growth between 1996 and 2015, Africa’s contribution to the world market remained low, at only 1 percent of the global share in 2015. Most of its exports were low-tech manufactured goods.

Among developing and emerging industrial economies as a whole, the share of medium-high and high-tech manufactured exports increased from 39 percent in 1996 to 52 percent in 2015 (Figure 7.21).

“Globally, final consumption of energy increased from 5,786 million tonnes of oil equivalent in 1990 to 8,597 in 2014, a 49 percent rise

Figure 7.21
Medium-high and high-tech products accounting for more than half of manufactured exports in developing and emerging industrial economies in 2015 (percent of country group’s manufactured exports)



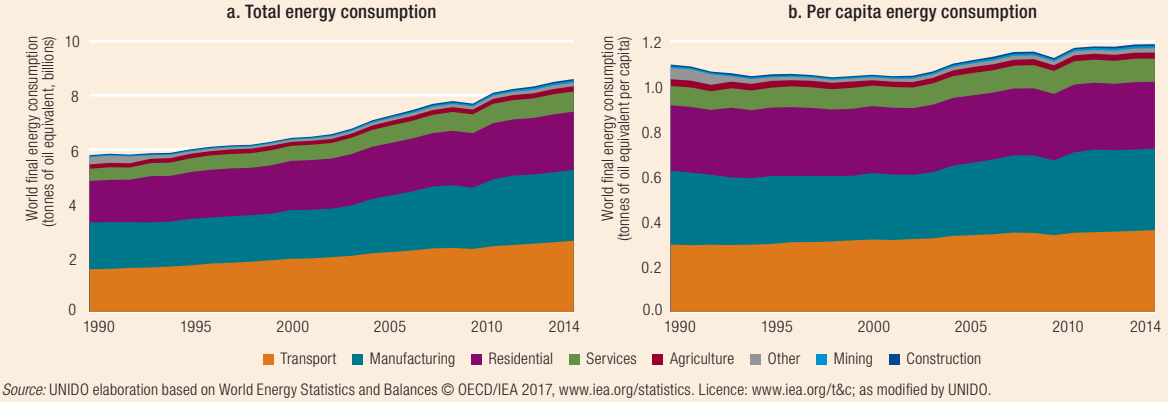
Note: All values are in current $. Industrialization level and technology classifications are based on, respectively, Annex C1, Table C1.2. and Annex C3, Table C3.2 (in this figure Building and repairing of ships and boats is classified as medium-high and high technology sector).
Source: UNIDO elaboration based on the United Nations Comtrade database (UNSD 2017).

Trends in manufacturing energy intensity

Energy intensity is defined as energy consumption per unit of MVA (less energy intensity means greater energy efficiency). It is expressed in millions of tonnes of oil equivalent (MTOE) divided by MVA in constant 2010 dollars.

Globally, final consumption of energy increased from 5,786 MTOE in 1990 to 8,597 MTOE in 2014, a 49 percent rise. The three largest sectors in 2014, which together accounted for 86 percent of the total, were transport (2,627 MTOE), manufacturing (2,622 MTOE) and residential (2,142 MTOE) (Figure 7.22, panel a). The fastest growth in energy consumption was in mining (85 percent increase been 1990 and 2014), transport (66 percent) and services (65 percent). Energy consumption in the manufacturing sector grew at an average annual rate of 2.8 percent in 2000–2014. Per capita final consumption of energy grew by 13 percent in 2000–2014, reaching almost 1.2 tonnes of oil equivalent in 2014 (Figure 7.22, panel b).

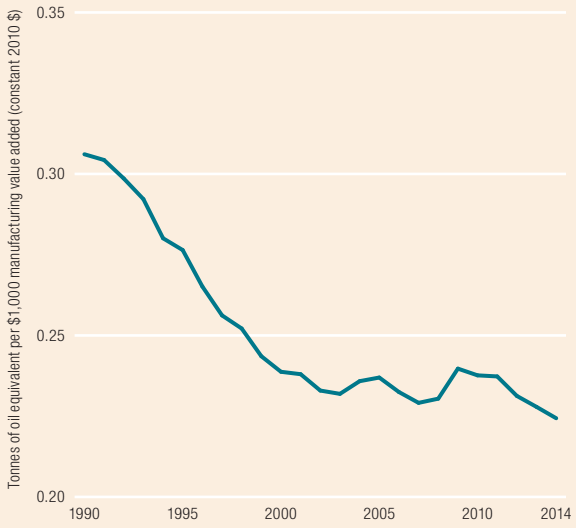
Figure 7.22
World final energy consumption, by sector



Source: UNIDO elaboration based on World Energy Statistics and Balances © OECD/IEA 2017, www.iea.org/statistics. Licence: www.iea.org/t&c; as modified by UNIDO.

“Global energy intensity in manufacturing decreased by an average annual rate of 1.3 percent between 1990 and 2014

Figure 7.23
A declining trend in world manufacturing energy intensity

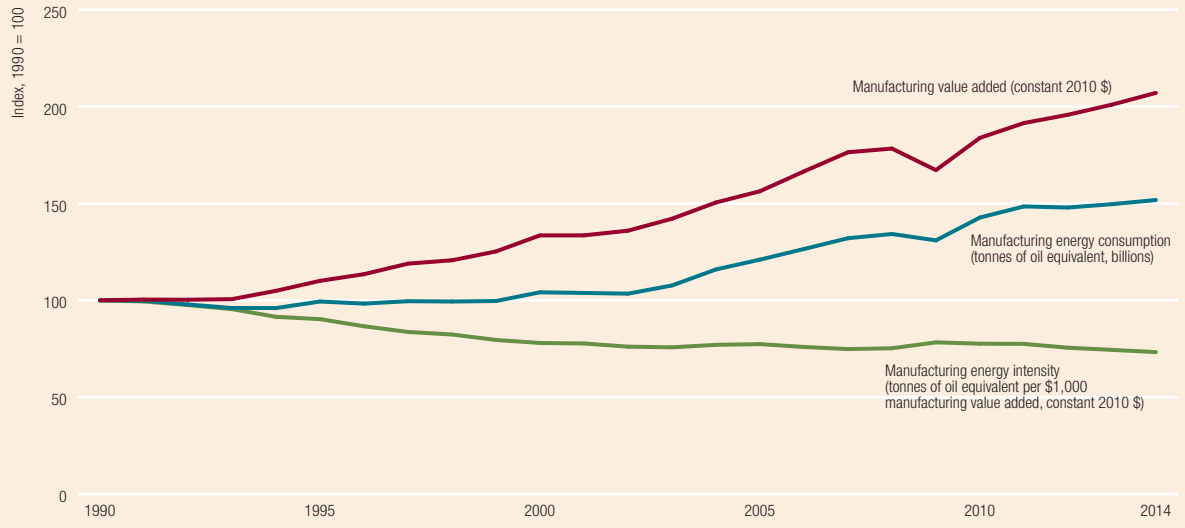


Source: UNIDO elaboration based on the Manufacturing Value Added 2017 database (UNIDO 2017f) and World Energy Statistics and Balances © OECD/IEA 2017, www.iea.org/statistics. Licence: www.iea.org/t&c; as modified by UNIDO.

The average annual growth of manufacturing energy consumption (1.8 percent) was slower than the growth of MVA (3.1 percent) in 1990–2014. MVA more than doubled in absolute value, whereas manufacturing energy consumption increased by only 52 percent (Figure 7.24).

Global energy intensity in manufacturing decreased by an average annual rate of 1.3 percent between 1990 and 2014. China had the highest consumption of energy. Its absolute value increased by a factor of more than four over this period, but its manufacturing energy intensity fell by 70 percent, the largest drop among all large energy consumers (Figure 7.25). Energy intensity fell almost 50 percent in the United States and 44 percent in India. Despite the decline, India was the most energy-intensive manufacturing economy in 2014. Brazil was the only large manufacturer to see energy intensity increase over this period.

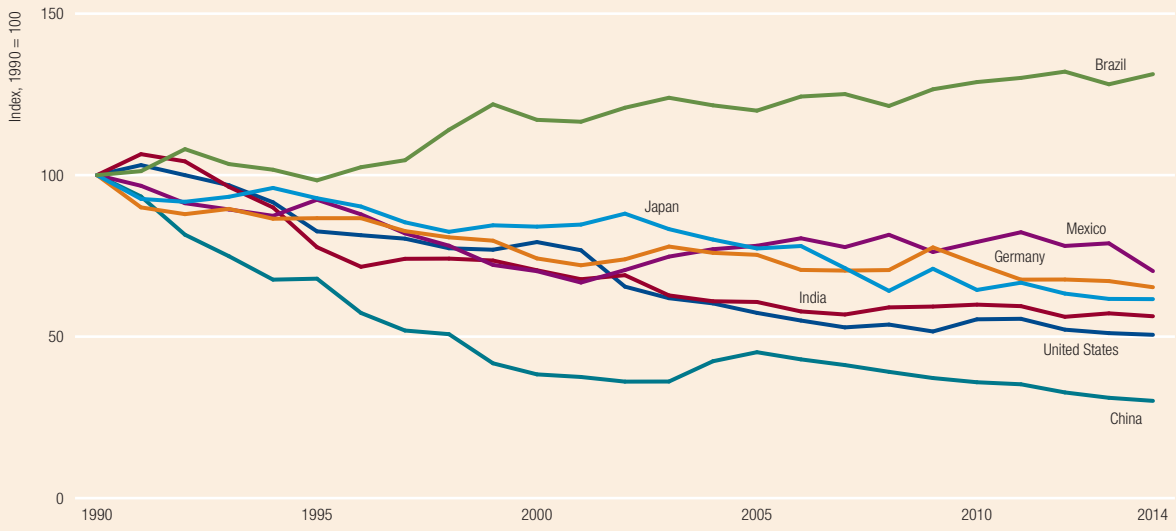
Figure 7.24
Global diverging trends in manufacturing value added, manufacturing energy consumption and manufacturing energy intensity



Note: Manufacturing value added is in constant 2010 $.
Source: UNIDO elaboration based on the Manufacturing Value Added 2017 database (UNIDO 2017f) and World Energy Statistics and Balances © OECD/IEA 2017, www.iea.org/statistics. Licence: www.iea.org/t&c; as modified by UNIDO.

“Energy intensity fell almost 44 percent in India and despite the decline, India was the most energy-intensive manufacturing economy in 2014

Figure 7.25
The majority of economies tend to decrease manufacturing energy intensity



Note: Manufacturing energy intensity is in tonnes of oil equivalent per $1,000 manufacturing value added (constant 2010 $).
Source: UNIDO elaboration based on the Manufacturing Value Added 2017 database (UNIDO 2017f) and World Energy Statistics and Balances © OECD/IEA 2017, www.iea.org/statistics. Licence: www.iea.org/t&c; as modified by UNIDO.

The various indicators presented in this chapter provide a broad characterization of the main industrial development trends observed at the world and regional level during the last decades. These trends reflect a changing global landscape in which some countries gained ground by improving their industrial production capabilities, expanding manufacturing production, employment and exports. The final chapter of the report complements this analysis by providing further evidence on the industrial competitiveness of countries as reflected in the most recent estimates of UNIDO’s Competitive Industrial Performance index.

Note

1. In this chapter, all references to 2016 values derived from the Manufacturing Value Added database (2017 edition; UNIDO 2017f) are preliminary estimates.

Chapter 8

The Competitive Industrial Performance index

The Competitive Industrial Performance index

UNIDO assesses and benchmarks industrial competitiveness through its Competitive Industrial Performance (CIP) index. It captures countries' ability of to produce and export manufactures competitively and to structurally transform.

The CIP index is a performance (or outcome) indicator. Its indicators help countries learn about the process of change, identify whether industrial policies are working and figure out how to make their manufacturing sectors more efficient. These indicators stand in contrast to "process" indicators, which are based on research-based evidence and can be used to validate or identify the processes that contributed to the observed outcomes.

Because technological learning is a cumulative, long-run process, CIP rankings tend to remain stable in the short run. Only in the medium to long term do industrial statistics and structural economic variables reveal the effect of learning. Structural transformation—industry-wide or economy-wide—is a long, path-dependent process. When leaps occur, they signal responses to major improvements or deteriorations in the basic conditions of industrial activity.

The 2015 CIP index includes eight indicators, defined along three dimensions (Figure 8.1 and Table 8.1). The first dimension covers a country's capacity to produce and export manufactures. It is captured by two indicators: manufacturing value added per capita (Indicator 1: MVA_{pc}) and manufactured exports per capita (Indicator 2: MX_{pc}).

The second dimension describes a country's level of technological deepening and upgrading. It is captured by two composite indicators: industrialization intensity (IND_{int}) and export quality (MX_{Qual}). IND_{int} is expressed by the share of manufacturing value added (MVA) in total gross domestic product (GDP) (Indicator 3: MVA_{sh}) and the share of medium-high and high-tech MVA in total MVA (Indicator 4: $MHVA_{sh}$). The second composite indicator, MX_{Qual}, comprises the share of medium-high and high-tech manufactured exports in total manufactured exports (Indicator 5: MHX_{sh}) and the share of manufactured exports in total exports (Indicator 6: MX_{sh}).

The third dimension of competitiveness is represented by the country's impact on world manufacturing, as measured by its share world manufacturing value added (Indicator 7: ImWMVA) and world manufacturing trade (Indicator 8: ImWMT).

Definitions of indicators

Composite index

The final composite index is based on three dimensions and eight indicators:

- Dimension 1: Capacity to produce and export manufactured goods
  - Indicator 1: MVA_{pc}
  - Indicator 2: MX_{pc}
- Dimension 2: Technological deepening and upgrading
  - Composite indicator combining indicators 3 and 4: $IND_{int} = (MHVA_{sh} + MVA_{sh})/2$
  - Composite indicator combining indicators 5 and 6: $MX_{Qual} = (MHX_{sh} + MX_{sh})/2$
- Dimension 3: World impact
  - Indicator 7: ImWMVA
  - Indicator 8: ImWMT

The composite index is the geometric mean of MVA_{pc}, MX_{pc}, IND_{int}, MX_{Qual}, ImWMVA and ImWMT.

“Countries in the top quintile accounted for more than 80 percent of global MVA and 86 percent of global manufacturing trade

Figure 8.1
Composition of the Competitive Industrial Performance index

Note: The composite CIP Index is computed as the equal-weighted geometric mean of MVA_{pc}, MX_{pc}, IND_{int}, MX_{Qual}, ImWMVA and ImWMT. Indicator 3 ($MHVA_{sh}$) captures the share of a country's medium- and high-tech manufacturing value added of its total manufacturing value added. Indicator 4 (MVA_{sh}) is simply the share of a country's manufacturing value added of its total production. Indicator 5 (MHX_{sh}) is the share of a country's medium- and high-tech manufacturing exports of its total manufacturing exports. Indicator 6 (MX_{sh}) denotes the share of a country's manufacturing exports of its total exports.
Source: UNIDO (2017c).

“In 2015 Germany was the world’s most industrially competitive country, for the 22nd consecutive year

Table 8.1
Definition of indicators

Indicator	Description
Manufacturing value added (MVA) per capita (MVA_{pc})	MVA_{pc} captures the level of a country’s industrialization. It is expressed per capita to adjust for country size. Unlike gross output, MVA is free of double-counting, because it excludes the cost of intermediate consumption. If all domestic production in every country were fully and equally exposed to international competition, this indicator would capture industrial competitiveness. However, exposure is limited by barriers to trade—natural and otherwise—such as policies, transport costs, natural resource endowments, technological infrastructure, legal and institutional variations and information gaps. In many countries, the competitive pressure is less intense for manufactures aimed at the home market than the foreign market.
Manufacturing exports per capita (MX_{pc})	MX_{pc} captures the ability of a country to produce goods competitively and implicitly to keep up with technological changes. It is expressed per capita to adjust for country size. Because export values do not reflect the share of local value added in a product, it is not possible to account for variations in local manufacturing capabilities across countries. As there is no direct way to adjust for this variation, one must consider individual country evidence of low-value-added assembly when analysing the CIP index.
Share of medium-high and high-tech MVA in total MVA ($MHVA_{sh}$)	$MHVA_{sh}$ captures the technological complexity of manufacturing. The higher the share of medium-high and high-tech MVA in total MVA, the more technologically complex the industrial structure of a country and its overall industrial competitiveness. The more complex the production structure, the greater the opportunities for learning and technological innovation.
Share of MVA in total gross domestic product (MVA_{sh})	MVA_{sh} indicates the contribution of manufacturing to total production.
Share of medium-high and high-tech manufactured exports in total manufactured exports (MHX_{sh})	MHX_{sh} captures the technological content and complexity of exports. The share of medium-high and high-tech products in manufactured exports is considered jointly with the previous indicator, because MHX_{sh} may differ substantially from $MHVA_{sh}$ in some circumstances. In large import-substituting developing countries, for example, the structure of MVA is more complex than the structure for manufactured exports.
Share of manufactured exports in total exports (MX_{sh})	MX_{sh} captures manufacturing weight in export activity.
Country-specific impact on world manufacturing value added (ImWMVA)	ImWMVA measures a country’s share in world MVA, which captures a country’s relative performance in, and impact on, world manufacturing.
Country-specific impact on world manufacturing exports (ImWMT)	ImWMT measures a country’s share in world manufactured exports. It shows a country’s competitive status relative to other countries in international markets. Gains in world market share reflect greater competitiveness, losses signal deterioration of competitiveness.

Source: UNIDO elaboration based on UNIDO (2002, 2014b and 2017c).

The 2015 CIP rankings

The 2015 CIP ranking includes 148 economies. Four new countries are listed compared with the CIP index 2014: Angola, Maldives, Montenegro and Myanmar. These economies accounted for about 99 percent of world manufactured exports and MVA in 2015. Table 8.2 displays them by five colour-highlighted quintiles: top, upper-middle, middle, lower-middle and bottom.

Countries in the top quintile accounted for more than 80 percent of global MVA and 86 percent of global manufacturing trade. The five most competitive countries included four high-income countries (Germany, Japan, the United States and the Republic of Korea) plus China. Together they accounted for 58 percent of global MVA.

In 2015 Germany was the world’s most industrially competitive country, for the 22nd consecutive year. It scored high on all three dimensions. Germany accounted for almost 10 percent of world manufacturing trade and more than 5 percent of world MVA. Medium-high and high-tech exports accounted for 74 percent of its exports and 64 percent of its MVA. Germany’s capacity to produce and export manufactures improved in 2015. The share of medium-high and high-tech value added in total MVA grew by an average annual rate of 1.1 percent in 1995–2015, to 61.0 percent.

“Germany’s share of medium-high and high-tech value added in total MVA grew by an average annual rate of 1.1 percent in 1995–2015, to 61 percent

Table 8.2
Competitive Industrial Performance index, 2015

Top quintile | Upper-middle quintile | Middle quintile | Lower-middle quintile | Bottom quintile

CIP ranking	CIP index	Country
1	0.541	Germany
2	0.406	Japan
3	0.401	China
4	0.394	United States
5	0.393	Korea, Republic of
6	0.339	Switzerland
7	0.288	Belgium
8	0.284	Netherlands
9	0.282	Singapore
10	0.281	Italy
11	0.278	France
12	0.272	Ireland
13	0.269	Taiwan Province of China
14	0.236	United Kingdom
15	0.236	Austria
16	0.234	Sweden
17	0.218	Czechia
18	0.216	Canada
19	0.202	Spain
20	0.186	Mexico
21	0.176	Malaysia
22	0.174	Denmark
23	0.168	Poland
24	0.161	Thailand
25	0.155	Finland
26	0.155	Slovakia
27	0.150	Hungary
28	0.142	Israel
29	0.129	Turkey
30	0.127	Australia
31	0.119	Norway
32	0.114	Russian Federation
33	0.110	Slovenia
34	0.105	Romania
35	0.105	Portugal
36	0.103	Brazil
37	0.100	Saudi Arabia

CIP ranking	CIP index	Country
38	0.093	Indonesia
39	0.086	India
40	0.083	Lithuania
41	0.080	Viet Nam
42	0.076	Philippines
43	0.074	United Arab Emirates
44	0.073	Luxembourg
45	0.073	Belarus
46	0.073	Argentina
47	0.072	South Africa
48	0.070	Qatar
49	0.068	New Zealand
50	0.066	Estonia
51	0.063	Chile
52	0.061	Kuwait
53	0.061	Greece
54	0.059	Bahrain
55	0.058	Trinidad and Tobago
56	0.055	Croatia
57	0.054	Bulgaria
58	0.048	Latvia
59	0.048	Iran, Islamic Republic of
60	0.044	Costa Rica
61	0.044	Peru
62	0.043	Tunisia
63	0.043	Venezuela, Bolivarian Republic of
64	0.043	Morocco
65	0.043	Ukraine
66	0.042	Oman
67	0.040	Kazakhstan
68	0.040	Serbia
69	0.039	Colombia
70	0.037	Egypt
71	0.035	Iceland
72	0.034	Malta
73	0.032	Guatemala
74	0.032	El Salvador

“Japan ranked second, even though its CIP score declined by an average of 1.3 percent a year between 1990 and 2015

Table 8.2 *(continued)*
Competitive Industrial Performance index, 2015

CIP ranking	CIP index	Country
75	0.031	Sri Lanka
76	0.031	Jordan
77	0.031	Bangladesh
78	0.031	Uruguay
79	0.028	Macedonia, Former Yugoslav Republic of
80	0.026	Pakistan
81	0.026	Swaziland
82	0.026	Nigeria
83	0.025	Hong Kong SAR, China
84	0.025	Botswana
85	0.025	Bosnia and Herzegovina
86	0.024	Namibia
87	0.024	Mauritius
88	0.023	Lebanon
89	0.023	Brunei Darussalam
90	0.021	Ecuador
91	0.020	Cambodia
92	0.020	Algeria
93	0.018	Honduras
94	0.016	Cyprus
95	0.015	Myanmar
96	0.015	Georgia
97	0.014	Paraguay
98	0.013	Bolivia, Plurinational State of
99	0.013	Jamaica
100	0.012	Mongolia
101	0.012	Armenia
102	0.011	Kenya
103	0.011	Azerbaijan
104	0.011	Côte d’Ivoire
105	0.011	Barbados
106	0.011	State of Palestine
107	0.011	Albania
108	0.011	Suriname
109	0.011	Gabon
110	0.011	Congo, Republic of the
111	0.010	Senegal
112	0.010	Syrian Arab Republic
113	0.010	Fiji
114	0.010	Moldova, Republic of
115	0.010	Papua New Guinea
116	0.009	Cameroon
117	0.009	Bahamas
118	0.008	Zambia
119	0.008	Panama
120	0.008	Tanzania, United Republic of
121	0.007	Ghana
122	0.007	Kyrgyzstan
123	0.007	Montenegro
124	0.006	Madagascar
125	0.005	Belize
126	0.005	Uganda
127	0.004	Mozambique
128	0.004	Nepal
129	0.004	Iraq
130	0.004	Malawi
131	0.004	Niger
132	0.003	Angola
133	0.003	Haiti
134	0.003	Cabo Verde
135	0.003	Yemen
136	0.003	Bermuda
137	0.003	Tajikistan
138	0.003	Saint Lucia
139	0.002	Rwanda
140	0.002	Afghanistan
141	0.002	Macao SAR, China
142	0.002	Maldives
143	0.002	Central African Republic
144	0.001	Burundi
145	0.000	Eritrea
146	0.000	Ethiopia
147	0.000	Gambia
148	0.000	Tonga

Note: MVA is manufacturing value added. CIP is Competitive Industrial Performance.
Source: UNIDO elaboration based on the Competitive Industrial Performance Index 2017 database (UNIDO 2017b).

“Germany and Japan retained their positions; the rankings of most other industrialized economies were lower in 2015 than they were in 2010

Table 8.3
Industrial competitiveness ranking and selected indicators for industrialized economies and world ranking comparison, 2010 and 2015

Top quintile | Upper-middle quintile | Middle quintile | Lower-middle quintile | Bottom quintile

Group ranking 2015	World ranking 2010	World ranking 2015	Country	MVA per capita (2010 $) 2015	Manufactured exports per capita (current $) 2015	Impact of a country on world MVA (percent) 2015	Impact of a country on world manufactures trade (percent) 2015
1	1	1	Germany	9,429.7	14,625.5	6.3	9.8
2	2	2	Japan	8,495.8	4,484.6	9.0	4.7
3	3	4	United States	6,072.6	3,000.5	16.3	8.0
4	4	5	Korea, Republic of	7,336.4	10,189.4	3.1	4.3
5	5	6	Switzerland	14,403.8	24,652.2	1.0	1.7
6	10	7	Belgium	5,961.3	31,031.2	0.6	2.9
7	11	8	Netherlands	5,507.6	23,069.0	0.8	3.3
8	7	9	Singapore	9,536.5	27,476.0	0.4	1.3
9	8	10	Italy	4,840.0	6,837.9	2.4	3.4
10	9	11	France	4,350.9	6,772.2	2.3	3.6
11	14	12	Ireland	12,753.2	25,009.8	0.5	1.0
12	12	13	Taiwan Province of China	4,643.9	11,528.8	0.9	2.2
13	15	14	United Kingdom	3,508.9	5,541.1	1.9	3.0
14	16	15	Austria	8,337.8	15,193.3	0.6	1.1
15	13	16	Sweden	8,567.7	12,742.7	0.7	1.0
16	19	17	Czechia	5,049.3	13,930.5	0.4	1.2
17	17	18	Canada	4,840.2	6,771.4	1.4	2.0
18	18	19	Spain	3,479.5	5,005.3	1.3	1.9
19	21	21	Malaysia	2,533.9	5,547.0	0.6	1.4
20	22	22	Denmark	6,922.6	12,370.3	0.3	0.6
21	20	25	Finland	6,758.1	9,201.6	0.3	0.4
22	29	26	Slovakia	3,865.8	13,105.1	0.2	0.6
23	27	27	Hungary	2,669.9	9,223.6	0.2	0.8
24	25	28	Israel	4,163.9	7,627.6	0.3	0.5
25	28	30	Australia	4,158.0	3,607.9	0.8	0.7
26	30	31	Norway	6,651.1	6,218.0	0.3	0.3
27	33	32	Russian Federation	1,437.2	1,091.0	1.7	1.3
28	34	33	Slovenia	4,366.7	11,631.9	0.1	0.2
29	35	35	Portugal	2,588.3	4,950.3	0.2	0.4
30	43	40	Lithuania	2,802.8	7,536.3	0.1	0.2
31	54	43	United Arab Emirates	3,572.0	3,630.5	0.3	0.3
32	44	44	Luxembourg	5,192.5	19,415.0	0.0	0.1
33	56	48	Qatar	7,006.6	3,363.5	0.1	0.1
34	46	49	New Zealand	3,711.1	3,395.2	0.1	0.1
35	51	50	Estonia	2,554.6	8,835.7	0.0	0.1

“China improved its position, rising to third place in 2015. Mexico and Poland climbed three places, thanks to increases in their industrial intensity

Table 8.3 *(continued)*
Industrial competitiveness ranking and selected indicators for industrialized economies and world ranking comparison, 2010 and 2015

Group ranking 2015	World ranking 2010	World ranking 2015	Country	MVA per capita (2010 $) 2015	Manufactured exports per capita (current $) 2015	Impact of a country on world MVA (percent) 2015	Impact of a country on world manufactures trade (percent) 2015
36	49	52	Kuwait	2,273.9	5,210.5	0.1	0.2
37	45	54	Bahrain	3,238.1	6,016.9	0.0	0.1
38	71	71	Iceland	6,216.7	3,726.6	0.0	0.0
39	65	72	Malta	2,241.7	5,347.3	0.0	0.0
40	73	83	Hong Kong SAR, China	504.5	749.5	0.0	0.0
41	132	136	Bermuda	828.4	120.8	0.0	0.0
42	131	141	Macao SAR, China	496.0	38.0	0.0	0.0

Note: All values for world manufacturing value added (MVA) are in constant 2010 $, and values for world manufactures trade are in current $. Yellow indicates a fall in the rankings from 2010; blue-green is a rise; neither colour indicates no change.
Source: UNIDO elaboration based on the Competitive Industrial Performance Index 2017 database (UNIDO 2017b).

Table 8.4
Industrial competitiveness ranking and selected indicators for emerging industrial economies and world ranking comparison, 2010 and 2015

■ Top quintile ■ Upper-middle quintile ■ Middle quintile ■ Lower-middle quintile ■ Bottom quintile

Group ranking 2015	World ranking 2010	World ranking 2015	Country	MVA per capita (2010 $) 2015	Manufactured exports per capita (current $) 2015	Impact of a country on world MVA (percent) 2015	Impact of a country on world manufactures trade (percent) 2015
1	6	3	China	2047.6	1601.4	23.5	18.4
2	23	20	Mexico	1592.7	2611.7	1.7	2.8
3	26	23	Poland	2481.3	4445.3	0.8	1.4
4	24	24	Thailand	1657.4	2754.8	0.9	1.6
5	32	29	Turkey	1813.8	1549.0	1.2	1.0
6	36	34	Romania	1909.4	2697.1	0.3	0.4
7	31	36	Brazil	1202.7	540.4	2.1	0.9
8	37	37	Saudi Arabia	2462.4	1886.8	0.6	0.5
9	38	38	Indonesia	830.1	393.4	1.8	0.8
10	41	39	India	298.0	167.9	3.3	1.8
11	42	45	Belarus	1496.6	2372.5	0.1	0.2
12	39	46	Argentina	1859.2	602.1	0.7	0.2
13	40	47	South Africa	952.2	876.5	0.4	0.4
14	48	51	Chile	1481.4	1865.0	0.2	0.3
15	47	53	Greece	1553.4	2034.1	0.1	0.2
16	55	56	Croatia	1635.6	2593.8	0.1	0.1

“Bulgaria and Latvia moved from the third to the second quintile by increasing their export capacity and technological deepening

Table 8.4 *(continued)*
Industrial competitiveness ranking and selected indicators for emerging industrial economies and world ranking comparison, 2010 and 2015

Group ranking 2015	World ranking 2010	World ranking 2015	Country	MVA per capita (2010 $) 2015	Manufactured exports per capita (current $) 2015	Impact of a country on world MVA (percent) 2015	Impact of a country on world manufactures trade (percent) 2015
17	60	57	Bulgaria	980.4	2589.4	0.1	0.2
18	62	58	Latvia	1539.0	4713.9	0.0	0.1
19	64	60	Costa Rica	1460.9	1393.0	0.1	0.1
20	61	62	Tunisia	683.3	1125.2	0.1	0.1
21	52	63	Venezuela, Bolivarian Republic of	1561.8	427.2	0.4	0.1
22	57	65	Ukraine	342.4	609.0	0.1	0.2
23	68	66	Oman	1533.1	1901.3	0.1	0.1
24	66	67	Kazakhstan	1072.1	637.0	0.2	0.1
25	72	68	Serbia	643.6	1258.0	0.0	0.1
26	67	69	Colombia	813.5	234.0	0.3	0.1
27	76	78	Uruguay	1652.9	926.2	0.0	0.0
28	89	79	Macedonia, Former Yugoslav Republic of	629.2	2001.5	0.0	0.0
29	86	87	Mauritius	1291.7	1260.0	0.0	0.0
30	81	89	Brunei Darussalam	4559.7	1013.2	0.0	0.0
31	92	94	Cyprus	843.2	649.3	0.0	0.0
32	98	108	Suriname	1268.2	529.9	0.0	0.0

Note: All values for world manufacturing value added (MVA) are in constant 2010 $, and values for world manufactures trade are in current $. Yellow indicates a fall in the rankings from 2010; blue-green is a rise; neither colour indicates no change.
Source: UNIDO elaboration based on the Competitive Industrial Performance Index 2017 database (UNIDO 2017b).

Japan ranked second, even though its CIP score declined by an average of 1.3 percent a year between 1990 and 2015. It remains the world's leader on export quality. It needs to deepen and upgrade its technological level, as, the shrinking size of its workforce means that increases in value added will need to come from productivity gains.

China, the world's largest manufacturing producer and exporter, moved from fifth to third place in 2015. Its economy accounted for 18.4 percent of world trade in manufactured goods and 23.5 percent of global MVA. Manufactured exports represented almost 97 percent of China's total exports. Despite fast economic growth, China still lagged other industrial economies in manufacturing per capita and manufactured exports per capita. Its capacity to produce and export manufactures resembles that of Turkey and Oman.

The United States, the world's second largest contributor to world MVA in 2015, ranked fourth. The Republic of Korea ranked fifth.

Performance of industrialized economies

Germany and Japan retained their positions; the rankings of most other industrialized economies were lower in 2015 than they were in 2010 (Table 8.3).

Other countries in the top quintile include Switzerland, Belgium, the Netherlands and Singapore. All of them have very high manufactured exports per capita and large shares of medium-high and high-tech activities in trade and production. Belgium, the Netherlands, Slovakia and Lithuania moved up by three places since 2010; Ireland moved up two places. The United Arab Emirates climbed eleven spots and Qatar rose by eight.

“Viet Nam rose by 18 places and the Philippines by 11; both improved their performance in all dimensions

Table 8.5
Industrial competitiveness ranking and selected indicators for other developing economies and world ranking comparison, 2010 and 2015

Top quintile | Upper-middle quintile | Middle quintile | Lower-middle quintile | Bottom quintile

Group ranking 2015	World ranking 2010	World ranking 2015	Country	MVA per capita (2010 $) 2015	Manufactured exports per capita (current $) 2015	Impact of a country on world MVA (percent) 2015	Impact of a country on world manufactures trade (percent) 2015
1	59	41	Viet Nam	336.5	1,469.2	0.3	1.1
2	53	42	Philippines	594.0	544.8	0.5	0.5
3	50	55	Trinidad and Tobago	2,738.9	5,564.0	0.0	0.1
4	58	59	Iran, Islamic Republic of	708.2	341.8	0.5	0.2
5	63	61	Peru	843.0	563.6	0.2	0.1
6	69	64	Morocco	474.5	511.8	0.1	0.1
7	70	70	Egypt	436.6	164.0	0.3	0.1
8	75	73	Guatemala	550.7	470.4	0.1	0.1
9	77	74	El Salvador	745.5	834.2	0.0	0.0
10	78	75	Sri Lanka	598.3	376.1	0.1	0.1
11	74	76	Jordan	650.3	677.1	0.0	0.0
12	79	80	Pakistan	146.5	94.2	0.2	0.1
13	80	81	Swaziland	1,441.3	888.9	0.0	0.0
14	88	82	Nigeria	254.4	91.1	0.4	0.1
15	90	84	Botswana	454.2	2,683.5	0.0	0.1
16	84	85	Bosnia and Herzegovina	527.0	1,075.9	0.0	0.0
17	87	86	Namibia	603.3	1,759.4	0.0	0.0
18	83	88	Lebanon	703.5	446.7	0.0	0.0
19	85	90	Ecuador	634.9	223.3	0.1	0.0
20	91	92	Algeria	263.7	272.2	0.1	0.1
21	94	93	Honduras	376.4	325.3	0.0	0.0
22	100	96	Georgia	428.3	283.8	0.0	0.0
23	105	97	Paraguay	411.9	236.2	0.0	0.0
24	97	98	Bolivia, Plurinational State of	258.3	236.5	0.0	0.0
25	96	99	Jamaica	361.3	379.9	0.0	0.0
26	113	100	Mongolia	217.3	927.1	0.0	0.0
27	111	101	Armenia	410.9	305.3	0.0	0.0
28	104	102	Kenya	118.6	58.9	0.0	0.0
29	103	103	Azerbaijan	307.3	161.5	0.0	0.0
30	102	105	Barbados	783.6	754.8	0.0	0.0
31	115	106	State of Palestine	291.2	171.8	0.0	0.0
32	106	107	Albania	273.1	421.9	0.0	0.0
33	110	109	Gabon	471.5	647.7	0.0	0.0
34	112	110	Congo, Republic of the	136.8	560.3	0.0	0.0
35	95	112	Syrian Arab Republic	56.5	240.3	0.0	0.0

“The contribution of least developed countries to world MVA (0.6 percent) and total manufacturing trade (0.4 percent) was negligible in 2015

Table 8.5 *(continued)*
Industrial competitiveness ranking and selected indicators for other developing economies and world ranking comparison, 2010 and 2015

Group ranking 2015	World ranking 2010	World ranking 2015	Country	MVA per capita (2010 $) 2015	Manufactured exports per capita (current $) 2015	Impact of a country on world MVA (percent) 2015	Impact of a country on world manufactures trade (percent) 2015
36	114	113	Fiji	534.5	422.8	0.0	0.0
37	119	114	Moldova, Republic of	189.9	198.0	0.0	0.0
38	116	115	Papua New Guinea	104.4	324.5	0.0	0.0
39	109	116	Cameroon	183.5	45.6	0.0	0.0
40	108	117	Bahamas	722.9	352.5	0.0	0.0
41	118	119	Panama	631.8	70.9	0.0	0.0
42	125	121	Ghana	90.6	79.0	0.0	0.0
43	122	122	Kyrgyzstan	149.6	83.9	0.0	0.0
44	121	123	Montenegro	309.8	353.3	0.0	0.0
45	124	125	Belize	320.7	368.6	0.0	0.0
46	147	129	Iraq	112.7	9.1	0.0	0.0
47	133	132	Angola	206.4	20.4	0.0	0.0
48	136	134	Cabo Verde	195.4	71.2	0.0	0.0
49	127	137	Tajikistan	48.9	15.5	0.0	0.0
50	135	138	Saint Lucia	188.5	318.9	0.0	0.0
51	140	142	Maldives	263.6	77.7	0.0	0.0
52	148	148	Tonga	233.0	16.0	0.0	0.0

Note: All values for world manufacturing value added (MVA) are in constant 2010 $, and values for world manufactures trade are in current $. Yellow indicates a fall in the rankings from 2010; blue-green rise is a rise; neither colour indicates no change.
Source: UNIDO elaboration based on the Competitive Industrial Performance Index 2017 database (UNIDO 2017b).

Table 8.6
Industrial competitiveness ranking and selected indicators for least developed countries and world ranking comparison, 2010 and 2015

■ Top quintile ■ Upper-middle quintile ■ Middle quintile ■ Lower-middle quintile ■ Bottom quintile

Group ranking 2015	World ranking 2010	World ranking 2015	Country	MVA per capita (2010 $) 2015	Manufactured exports per capita (current $) 2015	Impact of a country on world MVA (percent) 2015	Impact of a country on world manufactures trade (percent) 2015
1	82	77	Bangladesh	182.5	151.6	0.2	0.2
2	101	91	Cambodia	172.2	513.1	0.0	0.1
3	99	95	Myanmar	241.5	56.8	0.1	0.0
4	107	111	Senegal	120.8	104.5	0.0	0.0
5	117	118	Zambia	126.2	66.6	0.0	0.0
6	120	120	Tanzania, United Republic of	54.9	47.3	0.0	0.0
7	123	124	Madagascar	55.4	38.7	0.0	0.0

“Between 2010 and 2015 only 10 countries changed quintile

Table 8.6 *(continued)*
Industrial competitiveness ranking and selected indicators for least developed countries and world ranking comparison, 2010 and 2015

Group ranking 2015	World ranking 2010	World ranking 2015	Country	MVA per capita (2010 $) 2015	Manufactured exports per capita (current $) 2015	Impact of a country on world MVA (percent) 2015	Impact of a country on world manufactures trade (percent) 2015
8	129	126	Uganda	55.0	16.1	0.0	0.0
9	137	127	Mozambique	43.3	25.1	0.0	0.0
10	128	128	Nepal	40.6	17.8	0.0	0.0
11	130	130	Malawi	46.7	16.5	0.0	0.0
12	138	131	Niger	24.0	34.7	0.0	0.0
13	134	133	Haiti	73.1	6.2	0.0	0.0
14	126	135	Yemen	65.6	4.7	0.0	0.0
15	142	139	Rwanda	34.1	17.7	0.0	0.0
16	139	140	Afghanistan	67.4	2.9	0.0	0.0
17	141	143	Central African Republic	52.7	3.7	0.0	0.0
18	143	144	Burundi	21.8	3.7	0.0	0.0
19	146	145	Eritrea	29.6	0.5	0.0	0.0
20	145	146	Ethiopia	19.5	3.6	0.0	0.0
21	144	147	Gambia	26.1	0.4	0.0	0.0

Note: All values for world manufacturing value added (MVA) are in constant 2010 $, and values for world manufactures trade are in current $. Yellow indicates a fall in the rankings from 2010; blue-green is a rise; neither colour indicates no change.
Source: UNIDO elaboration based on the Competitive Industrial Performance Index 2017 database (UNIDO 2017b).

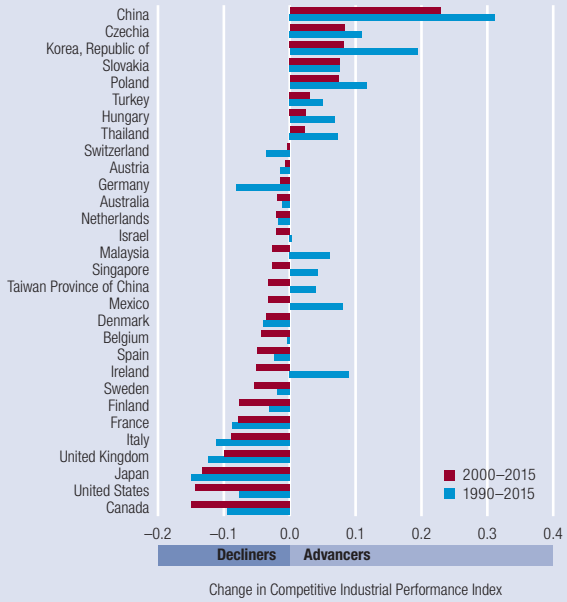
Performance of emerging industrial economies

China improved its position, rising to third place in 2015 (Table 8.4). Mexico and Poland climbed three places, thanks to increases in their industrial intensity. Bulgaria and Latvia moved from the third to the second quintile by increasing their export capacity and technological deepening, switching places with the Bolivarian Republic of Venezuela and Ukraine, which were downgraded. Among the BRICS (Brazil, the Russian Federation, India, China and South Africa), China, India and the Russian Federation climbed, and Brazil and South Africa slipped.

Performance of “other developing economies”

Viet Nam rose by 18 places and the Philippines by 11; both improved their performance in all dimensions (Table 8.5). A strength of the Philippines is the degree of technological deepening and upgrading, which

Figure 8.2
Changes in Competitive Industrial Performance index among economies in the top quintile



Source: UNIDO elaboration based on the Competitive Industrial Performance Index 2017 database (UNIDO 2017b).

"Countries outside the top quintile with large gains included Nigeria (which rose 51 places), Viet Nam (39) and Myanmar (33)

gives it potential to become the next hub of innovation and human capital development in South and South-East Asia.

Trinidad and Tobago fell five places. Botswana and the Republic of Moldova moved up a quintile, displacing Ecuador and Panama, respectively.

Performance of least developed countries

The contribution of least developed countries to world MVA (0.6 percent) and total manufacturing trade (0.4 percent) was negligible in 2015. It was dominated by a few countries, including Bangladesh and Cambodia (Table 8.6). Most countries are in the bottom quintile of the CIP ranking. Average MVA per capita in this group was $74 and average manufactured exports per capita $54. These economies lack the capacity to produce and export manufactured goods.

Changes in industrial competitiveness

Movements between performance quintiles are infrequent and typically take place at the crossover-points. Between 2010 and 2015 only 10 countries changed quintile. Rapid growth of manufactured exports and production per capita pushed Turkey into the top quintile, edging out Norway. Four other countries improved their industrial performance and moved to a higher quintile (Bulgaria and Latvia—from the middle to the upper-middle quintile; Botswana—from the lower-middle to the middle quintile; the Republic of Moldova—from the bottom to the lower-middle quintile). The Bolivarian Republic of Venezuela, Ukraine, Ecuador and Panama lost their rankings and fell to a lower quintile than in 2010.

Figure 8.2 shows long-term changes in industrial competitiveness for the top quintile. Among the most competitive countries, China and Poland saw sharp upward shifts between 1990 and 2015.

Changes between 1990 and 2015

China and Poland enjoyed the biggest changes in rankings, each moving up 29 positions between 1990 and 2015—China from 32nd to 3rd and Poland from 52nd to 23rd. Other very competitive countries that improved their ranks sharply were Czechia (twelve-place rise), Slovakia (twelve-place rise) and Turkey (eleven-place rise). Thailand climbed ten places and Malaysia seven. Mexico rose eleven places to reach 20th.

Among countries in the top quintile, the United Kingdom, Italy, Canada, Finland and Australia saw their rankings fall between 1990 and 2015. Both Canada and the United States were hit hard by the 2007–2008 financial crisis. The subsequent oil price shock caused Canada to slip ten places. Canada's technological deepening and upgrading is just a third that of the average country in the top twenty.

Germany and Japan remained in first and second places. China replaced the United States in third position.

Among countries outside the top quintile, Viet Nam gained 53 places to reach 41st, as years of dedicated policies to opening the country's boarders to trade and investments paid off.

Both Macao (SAR, China) and Hong Kong (SAR, China) tumbled in the rankings—by 85 and 62 places, respectively—as a result of severe deindustrialization and a shift to services. Among the BRICS (excluding China), only India improved its ranking (by 21 positions to 39th). Brazil, the Russian Federation and South Africa lost ground. There is still a wide gap between China and the other BRICS: China leads the Russian Federation (the second-place country in the group) by 29 places.

Changes between 2000 and 2015

China, Czechia, Slovakia and Poland enjoyed impressive gains between 2000 and 2015. Slovakia jumped twelve places, driven mainly by rapid growth in per capita manufactured exports and technological upgrading. Other countries lost ground: Canada, Finland, Italy and Australia fell by 6–13 places.

Among emerging industrial economies, Turkey climbed five places, earning a position in the top quintile. The Republic of Korea also performed well, rising to fourth in the world.

> **The 2015 CIP Index ranking shows a global manufacturing sector recovering despite economic and political insecurity**

Countries outside the top quintile with large gains included Nigeria (which rose 51 places), Viet Nam (39) and Myanmar (33). Although Nigeria expanded its manufacturing production and trade, its share in medium-high and high-tech manufactured exports declined. Viet Nam improved its performance on all dimensions. Other countries that improved their positions included the Republic of the Congo (which rose 22 places), Mongolia (21), the Islamic Republic of Iran (19), Cambodia (18) and Lithuania (18).

Towards a sustainable industrial competitiveness

The 2015 CIP Index ranking shows a global manufacturing sector recovering in an environment shaken by economic and political insecurity and mistrust in the benefits of globalization.

Increasing a country's technological deepening and upgrading is the key driver of the structural change process needed for emerging and developing countries to avoid the middle-income trap and move towards inclusive and sustainable industrial development.

Across countries, changes in industrial competitiveness are indicative of new leaderships, potentials and pitfalls as the world sees a renewed role for manufacturing—particularly, manufacturing driven by the new innovation and technology race—as key to securing inclusive and sustainable development (UNIDO 2017c).

Annexes

Annex A

Annexes to part A: Demand for manufacturing

Annex A1 Country classification used for the estimation of income elasticities and Engel curves

Table A1.1
Countries classified into global income groups

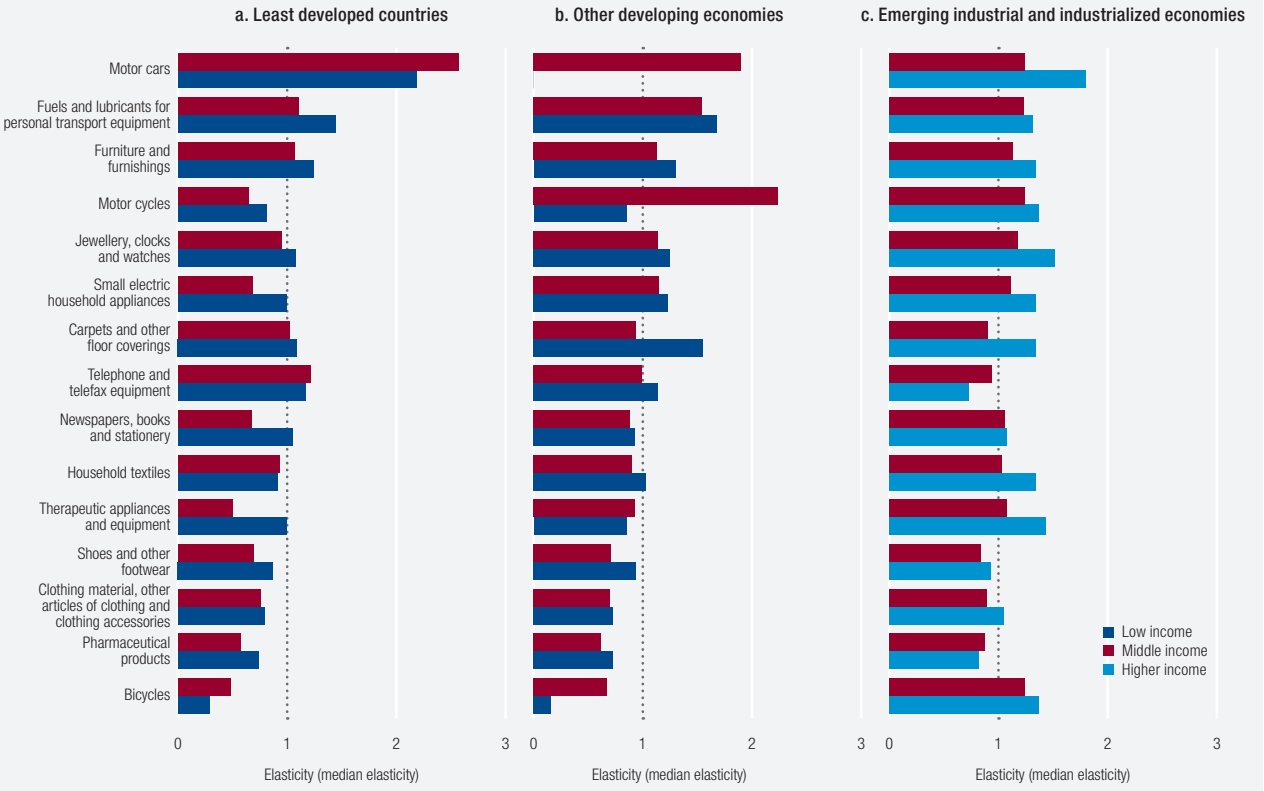
	Global income groups			
Country grouping	**Lowest income**	**Low income**	**Middle income**	**Higher income**
Least developed countries	Congo (Democratic Republic of), Madagascar	Afghanistan, Bangladesh, Burkina Faso, Chad, Ethiopia, Gambia, Lao People's Dem. Republic, Malawi, Mali, Mauritania, Mozambique, Nepal, Niger, Rwanda, Sierra Leone, Tanzania (United Republic of), Timor-Leste, Uganda, Zambia	Bhutan, Cambodia, Djibouti, Lesotho, São Tomé and Príncipe, Yemen	
Other developing economies		Armenia, Cameroon, Congo, Republic of, Egypt, Kenya, Kyrgyzstan, Mongolia, Nigeria, Pakistan, Philippines, Swaziland, Viet Nam	Albania, Azerbaijan, Bolivia (Plurinational State of), Cabo Verde, Côte d'Ivoire, El Salvador, Fiji, Gabon, Ghana, Guatemala, Honduras, Iraq, Jamaica, Jordan, Maldives, Moldova (Republic of), Morocco, Namibia, Papua New Guinea, Peru, Sri Lanka, Tajikistan	Bosnia and Herzegovina, Montenegro
Emerging industrial and industrialized economies		India, Indonesia	China, Kazakhstan, Mauritius, Mexico, Romania, Thailand, Ukraine	Belarus, Brazil, Bulgaria, Colombia, Latvia, Lithuania, Macedonia (Former Yugoslav Republic of), Russian Federation, Turkey, Serbia, South Africa

Note: Classification criteria: At least 5 percent of the country's richest population belong to one of the global income segments in Figure 2.2 (higher, middle, low, lowest). Industrialization level classification is based on Annex C1, Table C1.2.

Source: UNIDO elaboration based on dataset by Moneta and Stepanova (2017) derived from the Global Consumption Database (World Bank 2014).

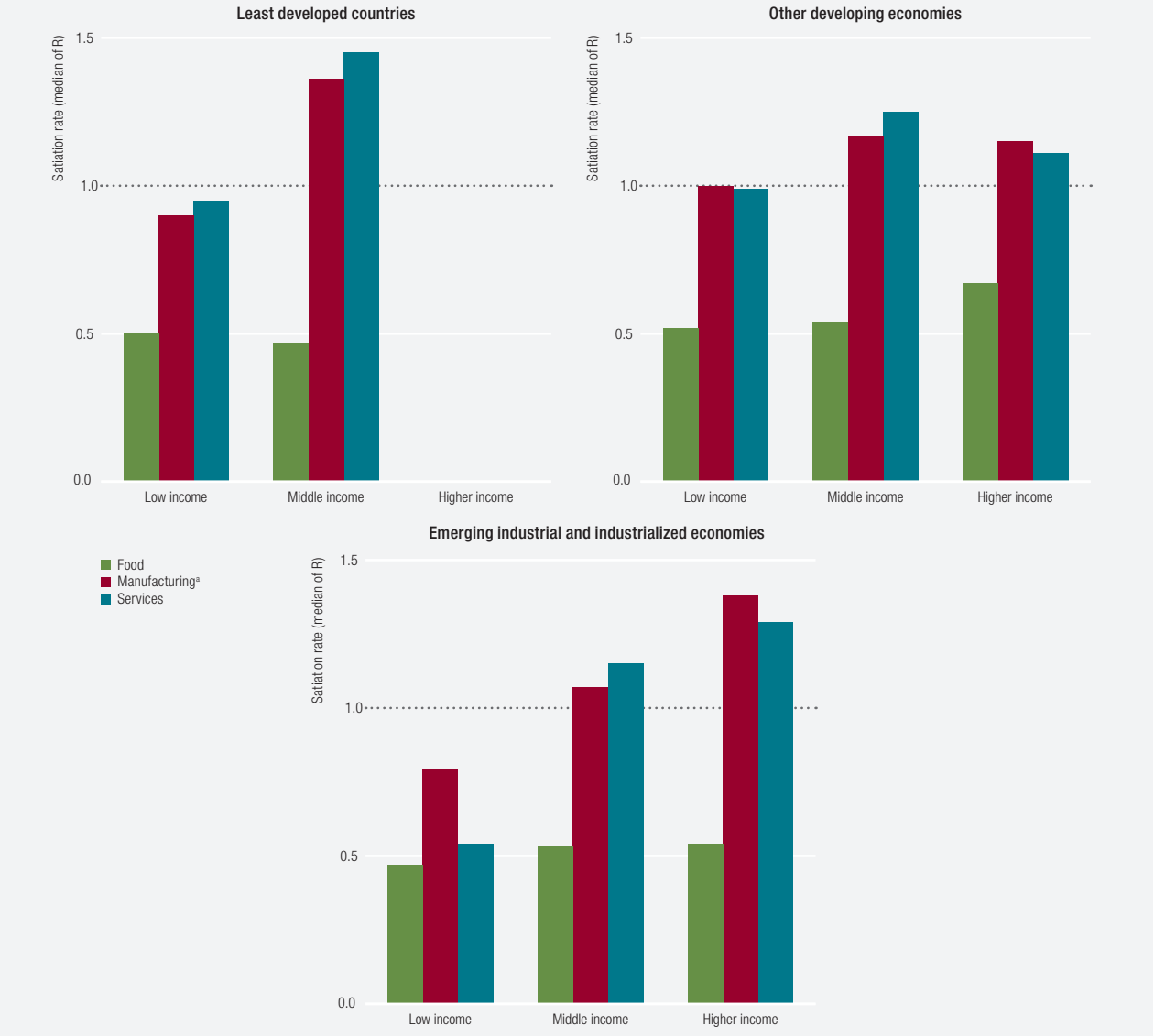
Annex A2 Median income elasticity and tendency of spending satiation across different income and economy groups

Figure A2.1
Differences in median income elasticities of selected manufacturing goods across economy groups



Note: All values are for 2010. A product is classified as a necessity if the elasticity is between 0 and 1. Income, manufacturing consumption goods and industrialization level classifications are based on, respectively, Annex A1, Table A1.1, Annex C4, Table C4.1 and Annex C1, Table C1.2.
Source: UNIDO elaboration based on dataset by Moneta and Stepanova (2017) derived from the Global Consumption Database (World Bank 2014).

Figure A2.2
Tendency of spending satiation across different income and economic groups



a. Excludes food and non-alcoholic beverages; alcoholic beverages, tobacco and narcotics and other personal effects.
Note: All values are for 2010. R is the satiation rate. There is a tendency of satiation below the dotted line at R = 1. Income, manufacturing consumption goods and industrialization level classifications are based on, respectively, Annex A1, Table A1.1, Annex C4, Table C4.1 and Annex C1, Table C1.2. Manufacturing consumption excludes food and non-alcoholic beverages, tobacco and narcotics and other personal effects.
Source: UNIDO elaboration based on dataset by Moneta and Stepanova (2017) derived from the Global Consumption Database (World Bank 2014).

Table A3.1
Indicators used in volume, price and variety analysis

Country group	GDP per capita (constant PPP$)	GDP per capita growth[a], 2003–2015 (percent)	Manufacturing income terms of trade[a] (index in 2010 $)	Manufacturing barter terms of trade[b] (constant 2010 $)	Export quantity index (constant 2010 PPP$)	Extensive margin[c] relative to the rest of the world	Change in extensive margins in trade, 2003–2015 (percent)	Number of active product lines	Intensive margin[c] relative to the rest of the world	Change in intensive margins in trade, 2003–2015 (percent)	Active product lines with a revealed comparative advantage equal to or larger than 1	Complexity of export basket[d] (percent)	Change in average complexity export basket (2003–2015)	Export share in top unit value segment	Change in export share of the top unit value segment (2003–2015)
Other developing economies															
Africa	8,646	47.0	168	126	129	0.78	0.07	2,302	0.0012	0.0002	387	–0.90	0.15	0.11	–0.02
Americas	12,360	52.3	122	119	106	0.78	0.08	2,232	0.0008	0.0001	324	–1.14	–0.01	0.11	–0.01
Asia and Pacific	6,793	54.1	151	100	149	0.90	0.07	3,286	0.0073	0.0025	682	–0.51	0.23	0.16	0.01
Europe	9,230	80.7	231	104	229	0.79	0.13	2,054	0.0003	0.0001	455	–0.45	0.13	0.15	0.01
Emerging industrial economies															
Africa	13,064	43.9	82	105	78	0.96	0.00	3,876	0.0044	0.0004	635	–0.31	–0.06	0.16	–0.04
Americas	17,511	52.8	98	117	84	0.97	0.00	3,813	0.0163	0.0013	534	0.07	0.10	0.12	0.04
Asia and Pacific	13,757	106.8	171	88	199	0.99	0.01	4,437	0.1340	0.0705	2,020	–0.03	0.39	0.11	–0.02
Europe	21,253	70.5	151	104	148	0.98	0.02	4,024	0.0089	0.0036	1,171	–0.03	0.26	0.14	0.01
Industrialized economies															
Americas	52,704	33.0	97	92	107	1.00	0.00	4,468	0.0741	–0.0141	1,381	0.47	0.01	0.19	0.01
Asia and Pacific	44,255	42.7	115	92	129	0.99	0.00	4,221	0.0314	–0.0138	953	0.41	0.16	0.25	0.03
Europe	43,363	38.9	137	97	143	1.00	0.00	4,348	0.0419	–0.0069	1,475	0.39	–0.04	0.30	–0.05
Least developed countries															
Africa	2,487	73.9	513	137	495	0.65	0.17	1,397	0.0006	0.0003	181	–1.25	–0.07	0.26	0.00
Asia and Pacific	3,386	80.2	154	86	193	0.56	0.06	1,432	0.0028	0.0012	292	–1.81	0.14	0.04	–0.04

a. Values are in constant 2010 PPP$. b. Chained Fisher Index. c. Hummels and Klenow (2005). d. Hidalgo and Hausmann (2009).
Note: GDP is gross domestic product and PPP is purchasing power parity. Regional and industrialization level classifications are based on, respectively, Annex C1, Tables C1.1 and C1.2.
Source: UNIDO elaboration based on World Development Indicators (World Bank 2017b) and BACI International Trade Database (Gaulier and Zignago 2010).

Annex B

Annexes to part B: Trends in industrial development indicators

Annex B1 Indicators of manufacturing value added and exports by industrialization level, development group, region and income

Table B1.1
Manufacturing value added per capita, 2010–2015 (constant 2010 $)

Grouping	2010	2011	2012	2013	2014	2015
World	1,500.1	1,543.9	1,559.7	1,582.7	1,611.7	1,638.1
By industrialization level						
Industrialized economies	5,260.6	5,341.3	5,314.8	5,335.8	5,398.0	5,456.3
Developing and emerging industrial economies	702.0	744.5	775.9	806.2	835.4	862.1
Emerging industrial economies	970.9	1,036.4	1,087.7	1,135.0	1,179.0	1,224.6
Other developing economies	310.4	319.3	321.2	330.2	344.7	345.3
Least developed countries	74.7	77.9	81.0	85.1	89.0	92.3
By region (developing and emerging industrial economies)						
Africa	184.4	185.6	189.0	193.5	200.1	201.1
Asia and Pacific	724.7	779.0	828.0	872.3	918.6	969.2
Europe	1,278.7	1,351.7	1,357.8	1,382.6	1,414.3	1,452.2
Latin America	1,222.1	1,263.7	1,257.7	1,264.1	1,240.5	1,176.3
By income						
High income	5,054.5	5,135.3	5,109.2	5,126.9	5,186.9	5,243.8
Upper-middle income	1,323.0	1,413.9	1,484.8	1,550.7	1,611.5	1,667.1
Lower-middle income	281.5	294.6	304.9	318.2	332.3	346.5
Low income	72.2	75.7	78.7	82.8	86.6	90.4

Note: Regional, industrialization and income level classifications are based on, respectively, Annex C1, Tables C1.1, C1.2 and C1.3.
Source: UNIDO elaboration based on the Manufacturing Value Added 2017 database (UNIDO 2017f).

Table B1.2
Manufactured exports per capita, 2010–2015 (current $)

Grouping	2010	2011	2012	2013	2014	2015
World	1,735.1	2,057.6	2,079.6	2,139.9	2,179.7	2,003.0
By industrialization level						
Industrialized economies	6,361.1	7,378.3	7,272.2	7,448.6	7,425.4	6,578.0
Developing and emerging industrial economies	660.1	803.1	843.2	878.3	919.9	877.3
Emerging industrial economies	861.0	1,028.4	1,075.3	1,123.3	1,167.9	1,084.1
Other developing economies	288.2	357.8	367.6	362.5	402.5	454.8
Least developed countries	54.2	73.4	74.6	76.5	74.1	61.6
By region (developing and emerging industrial economies)						
Africa	201.9	249.9	234.5	210.1	219.5	190.4
Asia and Pacific	637.4	777.2	830.5	883.4	920.5	870.4
Europe	1,876.6	2,329.2	2,347.1	2,421.0	2,472.9	2,152.0
Latin America	1,248.4	1,396.1	1,477.1	1,491.6	1,600.3	1,536.4
By income						
High income	6,793.2	7,879.7	7,716.5	7,911.7	7,891.9	7,018.4
Upper-middle income	1,295.9	1,537.2	1,682.1	1,744.2	1,831.6	1,706.4
Lower-middle income	227.7	283.9	288.0	307.5	311.0	287.3
Low income	46.9	61.8	59.4	59.0	56.8	55.4

Note: Regional, industrialization and income level classifications are based on, respectively, Annex C1, Tables C1.1, C1.2 and C1.3.
Source: UNIDO elaboration based on the United Nations Comtrade database (UNSD 2017) and the Manufacturing Value Added 2017 database (UNIDO 2017f).

Table B1.3
Impact of countries on world manufactures trade, 2010–2015 (percent)

Grouping	2010	2011	2012	2013	2014	2015
World	100.0	100.0	100.0	100.0	100.0	100.0
By industrialization level						
Industrialized economies	69.4	68.7	67.5	67.3	66.5	65.3
Developing and emerging industrial economies	30.6	31.3	32.5	32.7	33.4	34.7
Emerging industrial economies	27.4	28.0	29.2	29.5	30.3	31.3
Other developing economies	2.9	2.9	2.8	2.8	2.9	2.9
Least developed countries	0.4	0.4	0.4	0.4	0.2	0.5
By region (developing and emerging industrial economies)						
Africa	1.7	1.7	1.6	1.4	1.4	1.1
Asia and Pacific	20.0	20.6	21.6	22.3	23.1	24.6
Europe	3.9	4.1	4.1	4.1	4.1	4.0
Latin America	5.1	4.9	5.1	4.9	4.8	4.9
By income						
High income	68.6	68.0	66.5	66.4	65.7	64.8
Upper-middle income	26.2	26.5	27.8	27.8	28.6	29.4
Lower-middle income	4.9	5.2	5.3	5.4	5.5	5.4
Low income	0.4	0.4	0.4	0.4	0.2	0.4

Note: Manufacturing exports is in current $. Regional, industrialization and income level classifications are based on, respectively, Annex C1, Tables C1.1, C1.2 and C1.3.
Source: UNIDO elaboration based on the United Nations Comtrade database (UNSD 2017).

Table B1.4
Impact of countries on world manufacturing value added, 2010–2015 (percent)

Grouping	2010	2011	2012	2013	2014	2015
World	100.0	100.0	100.0	100.0	100.0	100.0
By industrialization level						
Industrialized economies	61.4	60.2	58.8	57.8	57.0	56.3
Developing and emerging industrial economies	38.6	39.8	41.2	42.2	43.0	43.7
Emerging industrial economies	34.4	35.6	36.9	37.8	38.5	39.2
Other developing economies	3.6	3.7	3.7	3.7	3.9	3.8
Least developed countries	0.6	0.6	0.6	0.7	0.7	0.7
By region (developing and emerging industrial economies)						
Africa	1.8	1.8	1.9	1.9	2.0	2.0
Asia and Pacific	26.8	28.0	29.4	30.5	31.5	32.7
Europe	2.9	3.0	3.0	2.9	2.9	2.9
Latin America	7.0	7.0	6.9	6.9	6.6	6.2
By income						
High income	62.6	61.4	60.1	59.0	58.2	57.5
Upper-middle income	30.2	31.2	32.3	33.2	33.7	34.2
Lower-middle income	6.7	6.8	7.0	7.2	7.4	7.7
Low income	0.6	0.6	0.6	0.6	0.6	0.7

Note: Manufacturing value added is in constant 2010 $. Regional, industrialization and income level classifications are based on, respectively, Annex C1, Tables C1.1, C1.2 and C1.3.
Source: UNIDO elaboration based on the Manufacturing Value Added 2017 database (UNIDO 2017f).

Table B1.5
Medium-high and high-tech manufacturing value added share in total manufacturing, 2010–2015 (percent)

Grouping	2010	2011	2012	2013	2014	2015
World	43.9	44.3	44.5	44.3	44.5	44.7
By industrialization level						
Industrialized economies	48.3	49.0	49.4	49.2	49.6	49.9
Developing and emerging industrial economies	36.1	36.4	36.5	36.9	37.1	37.3
Emerging industrial economies	37.7	38.0	38.1	38.4	38.6	38.8
Other developing economies	23.8	24.0	24.5	25.6	25.9	26.9
Least developed countries	9.0	8.6	8.3	7.8	7.4	7.3
By region (developing and emerging industrial economies)						
Africa	19.2	19.2	19.6	18.8	18.5	19.2
Asia and Pacific	40.0	40.1	40.1	40.5	40.6	40.8
Europe	31.2	32.1	32.1	32.2	32.4	33.2
Latin America	30.2	30.4	30.0	30.3	30.0	29.2
By income						
High income	47.9	48.5	48.9	48.7	49.1	49.3
Upper-middle income	37.5	37.9	38.0	38.5	38.9	39.1
Lower-middle income	33.9	33.6	33.6	34.0	33.5	33.8
Low income	8.3	7.9	7.6	7.3	7.0	6.7

Note: Manufacturing value added is in current $. Regional, industrialization, income level and technology classifications are based on, respectively, Annex C1, Tables C1.1, C1.2, C1.3 and Annex C3, Table C3.2.
Source: UNIDO elaboration based on the INDSTAT2 ISIC, Rev. 3. database (UNIDO 2017d) and the United Nations Comtrade database (UNSD 2017).

Table B1.6
Share of manufacturing value added in GDP, 2010–2015 (percent)

Grouping	2010	2011	2012	2013	2014	2015
World	15.8	16.0	15.9	16.0	16.0	16.1
By industrialization level						
Industrialized economies	14.1	14.1	14.0	13.9	13.9	13.8
Developing and emerging industrial economies	19.5	19.8	20.0	20.1	20.2	20.4
Emerging industrial economies	21.3	21.5	21.8	21.8	21.9	22.1
Other developing economies	11.7	11.9	11.8	12.0	12.3	12.6
Least developed countries	11.3	11.5	11.6	11.9	12.0	12.3
By region (developing and emerging industrial economies)						
Africa	9.9	10.1	10.0	10.3	10.5	10.5
Asia and Pacific	24.8	25.0	25.3	25.3	25.4	25.6
Europe	14.4	14.7	14.7	14.8	14.9	15.0
Latin America	13.8	13.8	13.5	13.4	13.1	12.8
By income						
High income	13.9	14.0	13.8	13.8	13.7	13.7
Upper-middle income	21.9	22.2	22.4	22.5	22.6	22.8
Lower-middle income	16.1	16.2	16.3	16.4	16.5	16.7
Low income	12.3	12.5	12.5	12.6	12.7	12.9

Note: GDP is gross domestic product. Manufacturing value added and GDP is in constant 2010 $. Regional, industrialization and income level classifications are based on, respectively, Annex C1, Tables C1.1, C1.2 and C1.3.
Source: UNIDO elaboration based on the Manufacturing Value Added 2017 database (UNIDO 2017f).

Table B1.7
Share of manufactured exports in total exports, 2010–2015 (percent)

Grouping	2010	2011	2012	2013	2014	2015
World	83.8	82.0	82.7	82.5	84.0	87.7
By industrialization level						
Industrialized economies	88.0	86.7	87.2	86.0	86.5	89.1
Developing and emerging industrial economies	75.6	73.4	74.7	76.3	79.3	85.4
Emerging industrial economies	82.2	80.0	80.3	81.2	84.3	88.4
Other developing economies	43.5	41.0	43.1	46.2	49.6	63.1
Least developed countries	58.7	68.4	73.7	73.7	66.0	76.7
By region (developing and emerging industrial economies)						
Africa	41.2	41.4	39.7	40.8	43.8	54.8
Asia and Pacific	80.9	78.1	80.1	81.7	83.9	89.3
Europe	91.4	91.3	91.0	90.3	90.9	91.3
Latin America	67.4	63.8	64.7	64.7	70.3	74.6
By income						
High income	87.9	86.3	86.6	85.4	86.1	89.2
Upper-middle income	78.5	76.8	79.1	79.9	83.0	86.8
Lower-middle income	65.6	62.8	62.7	66.9	69.0	78.4
Low income	67.6	77.8	76.1	73.5	58.9	78.8

Note: Manufacturing exports is in current $. Regional, industrialization and income level classifications are based on, respectively, Annex C1, Tables C1.1, C1.2 and C1.3.
Source: UNIDO elaboration based on the United Nations Comtrade database (UNSD 2017).

Annex B2 Summary of world trade by industrialization level, development group, region and income

Table B2.1
Total exports, 2010–2015 (current $, billions)

Grouping	2010	2011	2012	2013	2014	2015
World	13,658.5	16,432.2	16,386.7	17,095.1	16,950.5	14,656.5
By industrialization level						
Industrialized economies	9,020.0	10,677.0	10,492.8	11,040.5	10,946.4	9,421.8
Developing and emerging industrial economies	4,636.9	5,753.3	5,892.0	6,051.8	6,001.4	5,221.3
Emerging industrial economies	3,808.0	4,717.5	4,936.8	5,130.0	5,112.5	4,551.2
Other developing economies	750.2	951.3	874.6	842.9	836.9	588.3
Least developed countries	78.7	84.5	80.6	79.0	51.9	81.7
By region (developing and emerging industrial economies)						
Africa	460.8	552.1	549.7	490.5	465.2	263.9
Asia and Pacific	2,834.5	3,554.8	3,661.5	3,854.9	3,917.3	3,547.3
Europe	483.0	601.9	609.9	636.2	647.3	562.9
Latin America	858.6	1,044.4	1,070.9	1,070.3	971.7	847.1
By income						
High income	8,929.4	10,607.6	10,403.4	10,962.4	10,869.0	9,337.9
Upper-middle income	3,818.2	4,645.3	4,767.0	4,914.2	4,905.5	4,358.1
Lower-middle income	848.9	1,116.1	1,152.0	1,146.7	1,132.8	877.1
Low income	60.3	61.3	62.5	69.0	40.5	70.0

Note: Regional, industrialization and income level classifications are based on, respectively, Annex C1, Tables C1.1, C1.2 and C1.3.
Source: UNIDO elaboration based on the United Nations Comtrade database (UNSD 2017).

Table B2.2
Low-tech manufactured exports, 2010–2015 (current $, billions)

Grouping	2010	2011	2012	2013	2014	2015
World	2,194.3	2,609.1	2,599.4	2,769.8	2,862.1	2,618.8
By industrialization level						
Industrialized economies	1,198.1	1,392.5	1,347.8	1,422.4	1,465.7	1,294.6
Developing and emerging industrial economies	996.2	1,216.6	1,251.5	1,347.4	1,396.4	1,324.2
Emerging industrial economies	839.9	1,034.3	1,072.5	1,154.9	1,212.7	1,121.0
Other developing economies	127.8	147.4	144.6	157.1	170.3	159.1
Least developed countries	28.5	34.9	34.4	35.3	13.5	44.1
By region (developing and emerging industrial economies)						
Africa	46.9	47.5	46.0	47.5	47.6	38.5
Asia and Pacific	679.4	845.8	883.3	955.0	989.8	961.5
Europe	119.8	142.8	145.4	162.8	172.7	155.1
Latin America	150.2	180.5	176.8	182.0	186.2	169.1
By income						
High income	1,197.3	1,388.3	1,339.2	1,421.7	1,467.2	1,304.1
Upper-middle income	736.7	901.6	940.6	1,003.7	1,058.6	968.6
Lower-middle income	231.0	285.5	286.7	309.2	324.2	303.4
Low income	29.2	33.7	32.9	35.1	12.1	42.8

Note: Regional, industrialization and income level classifications are based on, respectively, Annex C1, Tables C1.1, C1.2 and C1.3. Technology classification is based on Annex C3, Table C3.2.
Source: UNIDO elaboration based on the United Nations Comtrade database (UNSD 2017).

Table B2.3
Medium-low tech manufactured exports, 2010–2015 (current $, billions)

Grouping	2010	2011	2012	2013	2014	2015
World	2,432.9	3,079.9	3,177.2	3,307.9	3,134.7	2,533.6
By industrialization level						
Industrialized economies	1,647.1	2,104.5	2,169.0	2,330.3	2,151.5	1,710.3
Developing and emerging industrial economies	785.8	975.4	1,008.6	977.6	983.2	823.3
Emerging industrial economies	657.2	821.8	870.9	859.1	866.8	742.3
Other developing economies	113.3	134.6	116.9	100.2	98.7	66.1
Least developed countries	15.4	19.1	20.8	18.2	17.7	14.8
By region (developing and emerging industrial economies)						
Africa	90.9	119.6	112.1	89.9	89.7	56.8
Asia and Pacific	406.1	509.8	523.1	549.5	579.9	511.8
Europe	135.1	180.3	189.5	176.5	172.5	138.9
Latin America	153.7	165.7	183.9	161.7	141.0	115.9
By income						
High income	1,581.8	2,024.6	2,064.0	2,219.7	2,045.3	1,646.9
Upper-middle income	677.9	830.3	897.8	873.9	885.2	744.7
Lower-middle income	163.8	213.5	203.8	201.9	194.3	132.7
Low income	9.3	11.5	11.9	12.4	9.9	9.3

Note: Regional, industrialization and income level classifications are based on, respectively, Annex C1, Tables C1.1, C1.2 and C1.3. Technology classification is based on Annex C3, Table C3.2.
Source: UNIDO elaboration based on the United Nations Comtrade database (UNSD 2017).

Table B2.4
Medium-high and high-tech manufactured exports share in total manufactured exports, 2010–2015 (percent)

Grouping	2010	2011	2012	2013	2014	2015
World	59.6	57.8	57.4	56.9	57.9	59.9
By industrialization level						
Industrialized economies	64.2	62.2	61.6	60.5	61.8	64.2
Developing and emerging industrial economies	49.1	48.1	48.6	49.6	50.0	51.8
Emerging industrial economies	52.2	50.8	51.0	51.7	51.8	53.7
Other developing economies	26.2	27.7	30.6	33.9	35.2	39.4
Least developed countries	5.1	6.6	7.2	8.0	8.9	6.0
By region (developing and emerging industrial economies)						
Africa	27.4	26.9	27.6	31.4	32.6	34.2
Asia and Pacific	52.7	51.2	52.1	52.2	52.2	53.5
Europe	42.2	41.2	39.6	40.9	41.3	42.8
Latin America	47.5	48.0	47.9	50.4	52.1	54.9
By income						
High income	64.6	62.7	62.2	61.1	62.5	64.6
Upper-middle income	52.8	51.5	51.2	52.2	52.2	54.7
Lower-middle income	29.1	28.8	32.1	33.3	33.7	36.6
Low income	5.5	5.1	5.8	6.4	8.2	5.7

Note: Manufacturing exports is in current $. Regional, industrialization, income level and technology classifications are based on, respectively, Annex C1, Tables C1.1, C1.2, C1.3 and Annex C3, Table C3.2.
Source: UNIDO elaboration based on the United Nations Comtrade database (UNSD 2017).

Annex B3 Indicators of competitive industrial performance by country and economy

Table B3.1
Competitive industrial performance, 2010 and 2015

	MVA per capita (constant 2010 $)		Manufactured exports per capita (current $)		Medium-high and high-tech MVA share in total manufacturing (percent, current $)		Share of MVA in GDP (percent, constant 2010 $)		Medium- and high-tech manufactured exports share in total manufactured exports (percent, current $)		Manufactured exports share in total exports (percent, current $)		Impact of a country world MVA (percent, constant 2010 $)		Impact of a country on world manufactures trade (percent, current $)	
Country	2010	2015	2010	2015	2010	2015	2010	2015	2010	2015	2010	2015	2010	2015	2010	2015
Afghanistan	70	67	3	3	9.48	9.51	12.18	10.32	0.00	0.05	19.63	16.48	0.02	0.02	0.00	0.00
Albania	249	273	402	422	6.56	6.69	6.06	5.98	15.42	9.07	75.26	63.33	0.01	0.01	0.01	0.01
Algeria	187	264	408	272	9.66	9.14	4.18	5.50	0.46	4.46	25.75	31.03	0.06	0.09	0.14	0.09
Angola	157	206	34	20	4.52	3.89	4.00	5.02	0.00	0.00	1.37	1.55	0.03	0.04	0.01	0.00
Argentina	1,780	1,859	867	602	26.00	26.00	15.78	15.00	45.02	46.13	52.42	46.04	0.71	0.67	0.33	0.22
Armenia	303	411	203	305	4.95	3.66	9.68	10.83	24.80	10.38	69.20	70.21	0.01	0.01	0.01	0.01
Australia	4,330	4,158	4,476	3,608	27.82	28.17	7.44	6.73	19.94	21.76	46.77	46.05	0.93	0.83	0.91	0.72
Austria	7,731	8,338	15,015	15,193	44.84	45.93	16.63	17.39	59.97	62.29	86.97	89.36	0.63	0.59	1.16	1.08
Azerbaijan	280	307	245	161	10.07	13.70	4.81	5.13	17.23	16.50	10.49	13.91	0.02	0.02	0.02	0.01
Bahamas	821	723	537	353	27.77	27.77	3.75	3.47	53.93	63.23	63.83	61.12	0.00	0.00	0.00	0.00
Bahrain	2,952	3,238	11,004	6,017	24.91	24.41	14.48	14.47	1.99	15.23	89.55	81.02	0.04	0.04	0.13	0.07
Bangladesh	122	182	121	152	9.14	9.47	16.05	18.76	2.14	2.03	95.43	95.65	0.18	0.24	0.17	0.18
Barbados	928	784	770	755	38.11	38.11	5.83	4.91	39.18	34.16	91.11	84.84	0.00	0.00	0.00	0.00
Belarus	1,398	1,497	2,362	2,372	39.98	37.99	24.02	24.30	39.17	38.76	88.68	84.50	0.13	0.12	0.21	0.19
Belgium	5,825	5,961	32,577	31,031	35.04	49.47	13.15	13.28	54.92	54.71	87.36	88.16	0.61	0.56	3.28	2.92
Belize	530	321	271	369	18.46	18.46	12.21	7.32	0.06	0.04	30.89	49.37	0.00	0.00	0.00	0.00
Bermuda	1,170	828	149	121	19.88	25.29	1.28	0.99	43.65	24.37	97.62	86.85	0.00	0.00	0.00	0.00
Bolivia, Plurinational State of	223	258	279	236	11.59	11.67	11.27	10.79	3.28	3.41	39.80	29.06	0.02	0.02	0.03	0.02
Bosnia and Herzegovina	487	527	910	1,076	16.14	17.55	10.88	10.94	23.00	24.87	72.69	80.39	0.02	0.02	0.03	0.03
Botswana	399	454	2,148	2,684	9.69	16.51	6.39	6.35	4.84	5.19	93.70	96.08	0.01	0.01	0.04	0.05
Brazil	1,415	1,203	669	540	36.63	35.16	12.71	10.79	36.30	41.46	67.30	58.77	2.71	2.08	1.22	0.94
Brunei Darussalam	5,195	4,560	1,307	1,013	3.32	3.32	14.91	14.15	82.80	82.59	4.08	6.75	0.02	0.02	0.00	0.00
Bulgaria	781	980	1,975	2,589	24.70	29.97	11.58	13.02	35.40	42.20	70.99	71.82	0.06	0.06	0.13	0.15
Burundi	22	22	2	4	3.08	2.57	10.24	8.88	23.95	21.72	15.73	37.39	0.00	0.00	0.00	0.00
Cabo Verde	184	195	56	71	27.10	27.10	5.43	5.57	0.00	0.13	59.26	55.20	0.00	0.00	0.00	0.00
Cambodia	115	172	254	513	0.26	0.26	14.69	16.87	7.94	8.92	65.17	93.57	0.02	0.02	0.03	0.07
Cameroon	172	184	62	46	7.61	7.61	15.01	14.08	11.45	14.81	32.80	26.25	0.03	0.04	0.01	0.01
Canada	4,747	4,840	6,594	6,771	30.40	30.57	10.06	9.75	55.72	59.11	62.14	64.77	1.56	1.45	2.07	2.03
Central African Republic	80	53	6	4	9.25	9.25	17.41	17.87	8.29	0.63	31.07	86.12	0.00	0.00	0.00	0.00
Chile	1,383	1,481	1,962	1,865	25.85	13.67	10.79	10.08	11.74	11.28	46.96	52.83	0.23	0.22	0.31	0.28
China	1,432	2,048	1,132	1,601	41.38	41.38	31.95	32.15	60.52	58.80	96.25	96.57	18.51	23.46	13.98	18.35

Table B3.1 *(continued)*
Competitive industrial performance, 2010 and 2015

	MVA per capita (constant 2010 $)		Manufactured exports per capita (current $)		Medium-high and high-tech MVA share in total manufacturing (percent, current $)		Share of MVA in GDP (percent, constant 2010 $)		Medium- and high-tech manufactured exports share in total manufactured exports (percent, current $)		Manufactured exports share in total exports (percent, current $)		Impact of a country world MVA (percent, constant 2010 $)		Impact of a country on world manufactures trade (percent, current $)	
Country	**2010**	**2015**	**2010**	**2015**	**2010**	**2015**	**2010**	**2015**	**2010**	**2015**	**2010**	**2015**	**2010**	**2015**	**2010**	**2015**
Colombia	798	813	280	234	25.06	20.94	12.76	10.88	35.97	45.98	32.60	31.62	0.35	0.33	0.12	0.09
Congo, Republic of the	107	137	594	560	2.42	2.42	3.55	4.25	83.42	93.80	34.91	38.53	0.00	0.01	0.02	0.02
Costa Rica	1,278	1,461	1,458	1,393	14.58	23.06	16.01	15.86	58.94	50.64	73.29	69.92	0.06	0.06	0.06	0.06
Côte d'Ivoire	168	153	185	93	14.99	14.99	13.59	10.22	32.54	22.01	36.16	20.28	0.03	0.03	0.03	0.02
Croatia	1,673	1,636	2,474	2,594	37.55	29.94	12.10	11.89	49.46	45.31	90.42	85.63	0.07	0.06	0.10	0.09
Cyprus	1,202	843	512	649	15.01	22.71	5.24	4.26	60.43	43.82	75.21	81.71	0.01	0.01	0.01	0.01
Czechia	4,187	5,049	11,443	13,930	45.00	50.51	21.25	23.97	67.94	68.96	90.99	93.43	0.42	0.44	1.11	1.22
Denmark	6,278	6,923	12,592	12,370	49.89	53.38	10.89	11.88	52.10	55.25	72.64	74.12	0.34	0.33	0.64	0.58
Ecuador	624	635	249	223	10.56	10.27	13.40	11.90	23.04	17.95	21.25	19.67	0.09	0.09	0.03	0.03
Egypt	421	437	200	164	23.84	14.20	16.07	16.29	25.88	32.79	62.37	68.30	0.33	0.33	0.15	0.12
El Salvador	667	746	640	834	19.13	19.13	18.80	19.25	15.48	13.28	85.96	93.18	0.04	0.04	0.04	0.04
Eritrea	26	30	0	0	6.06	7.58	5.83	5.82	14.67	14.67	34.57	34.57	0.00	0.00	0.00	0.00
Estonia	2,009	2,555	8,292	8,836	28.36	28.81	13.72	14.38	42.28	50.49	86.22	83.45	0.03	0.03	0.10	0.10
Ethiopia	12	20	3	4	10.92	16.08	3.90	4.48	31.91	32.76	9.84	8.54	0.01	0.02	0.00	0.00
Fiji	452	534	370	423	7.87	7.13	11.95	12.38	9.20	4.84	57.29	70.29	0.00	0.00	0.00	0.00
Finland	7,883	6,758	11,900	9,202	47.43	44.53	17.06	15.04	48.98	49.73	91.10	84.85	0.41	0.31	0.59	0.42
France	4,257	4,351	7,185	6,772	47.96	49.38	10.11	10.13	65.77	66.43	88.42	88.29	2.58	2.33	4.17	3.63
Gabon	400	472	648	648	5.39	5.39	4.79	4.86	10.09	10.09	18.23	18.23	0.01	0.01	0.01	0.01
Gambia	27	26	7	0	3.90	3.90	4.72	4.85	0.45	10.79	34.13	5.05	0.00	0.00	0.00	0.00
Georgia	289	428	240	284	17.16	15.71	10.57	11.60	48.98	39.73	73.88	69.33	0.01	0.01	0.01	0.01
Germany	8,479	9,430	13,719	14,625	59.57	61.40	19.94	20.63	72.34	74.11	86.81	88.83	6.57	6.33	10.16	9.83
Ghana	85	91	27	79	0.80	0.80	6.39	5.34	24.99	33.27	12.49	16.35	0.02	0.02	0.01	0.02
Greece	1,938	1,553	1,920	2,034	18.06	20.93	7.24	6.96	29.15	27.58	77.78	78.77	0.21	0.14	0.20	0.19
Guatemala	523	551	399	470	22.40	22.40	18.64	18.03	20.33	21.20	69.50	72.00	0.07	0.07	0.05	0.06
Haiti	59	73	6	6	5.26	5.26	8.83	9.92	3.80	3.80	82.97	82.97	0.01	0.01	0.00	0.00
Honduras	349	376	215	325	7.16	7.16	16.54	16.16	25.99	36.54	51.93	57.13	0.03	0.03	0.01	0.02
Hong Kong SAR, China	560	505	1,160	749	38.07	36.06	1.71	1.39	53.74	38.85	54.84	41.77	0.04	0.03	0.07	0.05
Hungary	2,385	2,670	8,306	9,224	56.13	58.78	18.37	18.50	77.63	76.60	87.79	90.63	0.23	0.22	0.77	0.76
Iceland	5,382	6,217	4,165	3,727	16.57	16.57	12.93	13.63	43.72	36.72	28.78	26.00	0.02	0.02	0.01	0.01
India	228	298	152	168	39.21	37.91	16.83	16.90	28.24	33.89	85.16	83.27	2.71	3.25	1.73	1.83
Indonesia	687	830	392	393	40.33	35.08	21.99	21.64	29.05	28.63	60.09	67.39	1.60	1.78	0.87	0.84
Iran, Islamic Republic of	746	708	379	342	45.68	39.79	11.84	12.01	23.91	31.69	33.55	19.69	0.53	0.47	0.26	0.20
Iraq	102	113	3	9	6.81	7.24	2.69	2.85	0.00	27.28	0.16	0.67	0.03	0.03	0.00	0.00
Ireland	9,648	12,753	23,488	25,010	60.54	61.02	20.25	19.65	53.84	55.85	91.65	94.05	0.43	0.50	1.00	0.98

Table B3.1 *(continued)*
Competitive industrial performance, 2010 and 2015

	MVA per capita (constant 2010 $)		Manufactured exports per capita (current $)		Medium-high and high-tech MVA share in total manufacturing (percent, current $)		Share of MVA in GDP (percent, constant 2010 $)		Medium- and high-tech manufactured exports share in total manufactured exports (percent, current $)		Manufactured exports share in total exports (percent, current $)		Impact of a country world MVA (percent, constant 2010 $)		Impact of a country on world manufactures trade (percent, current $)	
Country	2010	2015	2010	2015	2010	2015	2010	2015	2010	2015	2010	2015	2010	2015	2010	2015
Israel	4,371	4,164	7,574	7,628	61.97	42.81	13.86	12.27	55.79	57.25	96.21	96.02	0.31	0.28	0.52	0.51
Italy	5,068	4,840	6,870	6,838	42.70	42.73	14.18	14.10	53.93	54.93	91.62	92.21	2.91	2.41	3.77	3.41
Jamaica	373	361	421	380	18.77	18.77	7.74	7.39	5.51	0.87	92.58	87.55	0.01	0.01	0.01	0.01
Japan	8,404	8,496	5,539	4,485	55.64	55.34	19.45	18.92	79.75	79.85	91.62	90.84	10.31	8.95	6.49	4.73
Jordan	680	650	722	677	26.10	27.37	16.77	16.35	47.30	39.23	79.24	76.10	0.04	0.04	0.04	0.04
Kazakhstan	1,028	1,072	797	637	12.83	16.60	11.32	10.14	37.19	41.49	22.70	24.43	0.16	0.16	0.12	0.09
Kenya	112	119	63	59	8.52	13.07	11.26	10.46	24.93	21.62	48.85	48.66	0.04	0.05	0.02	0.02
Korea, Republic of	6,193	7,336	9,201	10,189	61.63	63.65	27.89	29.26	75.85	76.17	96.85	97.26	2.93	3.07	4.16	4.27
Kuwait	2,255	2,274	8,396	5,210	18.44	27.04	6.00	6.54	13.55	18.47	40.97	36.76	0.07	0.07	0.24	0.17
Kyrgyzstan	148	150	61	84	3.49	4.13	16.86	14.78	19.95	42.27	25.50	34.58	0.01	0.01	0.00	0.00
Latvia	1,366	1,539	3,423	4,714	23.26	21.52	12.03	10.67	35.18	41.60	80.85	80.83	0.03	0.03	0.07	0.08
Lebanon	674	703	708	447	19.95	19.95	7.61	9.73	46.81	37.61	72.22	75.69	0.03	0.03	0.03	0.02
Lithuania	2,008	2,803	5,707	7,536	30.00	23.14	16.89	18.20	37.83	40.76	85.63	85.37	0.06	0.07	0.16	0.18
Luxembourg	5,444	5,193	23,361	19,415	7.58	21.26	5.28	4.86	38.04	43.48	85.76	87.56	0.03	0.02	0.11	0.09
Macao SAR, China	291	496	243	38	4.05	6.31	0.55	0.88	0.00	2.23	43.47	9.78	0.00	0.00	0.00	0.00
Macedonia, Former Yugoslav Republic of	450	629	1,451	2,002	19.50	15.35	9.87	12.36	31.42	58.88	89.28	92.65	0.01	0.01	0.03	0.03
Madagascar	55	55	32	39	3.56	3.56	13.32	13.49	4.26	5.25	72.03	44.31	0.01	0.01	0.01	0.01
Malawi	47	47	20	16	11.34	11.34	9.91	9.97	14.64	35.62	27.64	26.22	0.01	0.01	0.00	0.00
Malaysia	2,159	2,534	5,889	5,547	42.61	42.56	24.48	24.02	63.49	61.76	83.30	84.03	0.59	0.64	1.52	1.40
Maldives	279	264	66	78	2.63	2.63	3.97	2.96	0.03	2.54	29.46	19.59	0.00	0.00	0.00	0.00
Malta	2,410	2,242	8,392	5,347	19.18	19.18	11.36	9.09	56.16	62.98	93.04	86.75	0.01	0.01	0.03	0.02
Mauritius	1,176	1,292	1,141	1,260	2.67	8.86	15.10	14.26	2.93	4.01	95.59	93.74	0.01	0.01	0.01	0.01
Mexico	1,467	1,593	2,014	2,612	36.92	39.76	16.57	16.73	78.71	80.07	80.09	87.16	1.68	1.68	2.20	2.76
Moldova, Republic of	151	190	141	198	8.35	18.76	10.60	11.03	13.09	30.78	61.57	61.79	0.01	0.01	0.01	0.01
Mongolia	181	217	458	927	2.05	6.66	6.81	5.51	1.91	0.31	62.93	59.91	0.00	0.01	0.01	0.02
Montenegro	303	310	307	353	16.26	16.06	4.55	4.29	31.85	23.58	46.71	62.62	0.00	0.00	0.00	0.00
Morocco	453	474	430	512	28.07	27.75	15.59	14.40	38.26	51.25	77.64	79.84	0.14	0.14	0.13	0.15
Mozambique	44	43	7	25	10.89	10.89	10.47	8.48	9.28	16.76	7.84	21.94	0.01	0.01	0.00	0.01
Myanmar	159	242	57	57	11.65	6.63	19.86	21.97	0.50	0.50	38.53	38.53	0.08	0.11	0.03	0.03
Namibia	642	603	1,430	1,759	7.45	7.35	12.49	10.29	14.34	34.19	53.63	70.65	0.01	0.01	0.03	0.03
Nepal	36	41	25	18	8.47	8.60	5.95	5.83	20.06	17.87	76.73	76.85	0.01	0.01	0.01	0.00
Netherlands	5,337	5,508	21,909	23,069	47.73	48.19	10.62	10.82	55.01	56.27	73.97	82.40	0.86	0.78	3.36	3.25
New Zealand	3,636	3,711	3,152	3,395	17.61	17.25	10.81	10.02	21.34	19.65	46.36	46.83	0.15	0.14	0.13	0.13
Niger	17	24	20	35	22.70	22.70	4.76	6.30	12.86	8.65	67.44	87.36	0.00	0.00	0.00	0.01
Nigeria	149	254	113	91	33.44	33.44	6.45	10.00	7.47	18.99	20.82	15.71	0.23	0.39	0.17	0.12

Table B3.1 *(continued)*
Competitive industrial performance, 2010 and 2015

	MVA per capita (constant 2010 $)		Manufactured exports per capita (current $)		Medium-high and high-tech MVA share in total manufacturing (percent, current $)		Share of MVA in GDP (percent, constant 2010 $)		Medium- and high-tech manufactured exports share in total manufactured exports (percent, current $)		Manufactured exports share in total exports (percent, current $)		Impact of a country world MVA (percent, constant 2010 $)		Impact of a country on world manufactures trade (percent, current $)	
Country	**2010**	**2015**	**2010**	**2015**	**2010**	**2015**	**2010**	**2015**	**2010**	**2015**	**2010**	**2015**	**2010**	**2015**	**2010**	**2015**
Norway	6,304	6,651	7,236	6,218	58.13	46.06	7.19	7.42	52.21	53.29	27.09	30.92	0.30	0.29	0.33	0.27
Oman	2,107	1,533	1,747	1,901	19.39	19.92	10.58	10.03	42.71	38.28	16.27	26.74	0.06	0.06	0.05	0.07
Pakistan	134	146	102	94	24.62	24.62	13.04	12.96	9.95	9.39	82.40	81.31	0.22	0.23	0.16	0.15
Panama	574	632	64	71	6.39	6.19	7.19	5.88	15.00	9.11	32.66	40.02	0.02	0.02	0.00	0.00
Papua New Guinea	81	104	345	325	12.61	12.61	5.68	5.64	9.06	8.06	43.86	51.40	0.01	0.01	0.02	0.02
Paraguay	361	412	152	236	21.92	21.92	11.18	10.77	13.18	21.54	14.47	18.83	0.02	0.02	0.01	0.01
Peru	780	843	614	564	15.48	14.72	15.59	14.21	5.25	7.08	50.39	53.20	0.22	0.22	0.17	0.15
Philippines	460	594	356	545	45.71	45.95	21.40	22.42	73.13	75.87	64.25	93.54	0.41	0.50	0.30	0.46
Poland	1,933	2,481	3,576	4,445	39.27	35.45	15.57	17.27	58.14	56.10	87.83	88.26	0.72	0.80	1.27	1.43
Portugal	2,605	2,588	4,287	4,950	26.43	25.74	11.59	11.79	39.59	39.35	91.84	92.72	0.27	0.22	0.42	0.43
Qatar	6,354	7,007	3,994	3,364	22.75	66.87	8.97	8.93	20.17	33.32	9.67	9.64	0.11	0.13	0.06	0.06
Romania	1,764	1,909	2,200	2,697	40.15	37.85	21.32	19.66	54.69	58.20	90.36	86.83	0.35	0.31	0.41	0.44
Russian Federation	1,362	1,437	983	1,091	25.04	25.60	12.83	12.81	24.02	27.96	35.45	45.51	1.88	1.72	1.30	1.30
Rwanda	30	34	9	18	6.66	6.66	5.45	4.94	7.62	14.71	46.78	50.21	0.00	0.00	0.00	0.00
Saint Lucia	216	188	245	319	7.83	7.83	3.08	2.75	30.00	37.55	61.64	80.07	0.00	0.00	0.00	0.00
Saudi Arabia	2,071	2,462	1,893	1,887	32.19	35.41	11.04	11.56	35.56	37.15	21.65	30.70	0.56	0.65	0.49	0.50
Senegal	121	121	119	105	20.80	21.65	12.08	11.56	14.05	15.07	71.42	60.55	0.02	0.02	0.01	0.01
Serbia	594	644	846	1,258	18.64	23.91	13.64	14.18	32.82	46.54	78.21	83.23	0.05	0.05	0.07	0.09
Singapore	9,392	9,537	32,222	27,476	84.79	80.38	20.21	18.78	68.99	71.11	89.76	91.86	0.46	0.44	1.51	1.28
Slovakia	3,128	3,866	11,103	13,105	46.61	48.19	18.95	20.90	66.26	70.66	93.80	94.75	0.16	0.17	0.55	0.59
Slovenia	4,109	4,367	10,814	11,632	48.35	48.65	17.56	18.41	62.96	62.84	90.83	90.46	0.08	0.08	0.20	0.20
South Africa	949	952	1,134	877	25.16	24.43	13.07	12.46	45.64	49.09	70.84	68.59	0.47	0.43	0.54	0.40
Spain	3,734	3,480	4,425	5,005	37.81	40.24	12.17	11.34	57.40	57.30	83.74	83.00	1.68	1.34	1.90	1.92
Sri Lanka	442	598	288	376	11.79	6.68	18.00	18.00	9.48	9.21	70.10	76.38	0.09	0.10	0.05	0.06
State of Palestine	291	291	91	172	5.32	2.20	13.28	12.20	8.28	12.27	90.29	83.74	0.01	0.01	0.00	0.01
Suriname	1,769	1,268	623	530	11.62	11.62	20.98	13.91	9.38	12.37	15.93	15.44	0.01	0.01	0.00	0.00
Swaziland	1,387	1,441	889	889	1.05	1.65	36.39	35.91	28.96	28.96	92.86	92.86	0.02	0.02	0.01	0.01
Sweden	8,507	8,568	15,145	12,743	45.04	48.92	16.36	15.56	57.69	59.88	89.70	88.93	0.77	0.70	1.31	1.04
Switzerland	13,664	14,404	22,317	24,652	61.35	63.04	18.42	19.11	69.50	71.15	89.34	70.07	1.03	1.00	1.61	1.70
Syrian Arab Republic	141	56	240	240	21.52	21.52	4.82	3.19	22.69	22.69	43.87	43.87	0.03	0.01	0.05	0.05
Taiwan Province of China	4,836	4,644	10,789	11,529	67.91	70.80	26.08	22.94	72.40	73.65	96.01	96.26	1.08	0.90	2.31	2.25
Tajikistan	110	49	15	15	3.65	2.49	14.74	5.49	66.30	66.30	13.82	13.82	0.01	0.00	0.00	0.00
Tanzania, United Republic of	47	55	42	47	12.00	6.83	6.89	6.78	13.58	20.22	48.54	43.18	0.02	0.02	0.02	0.02
Thailand	1,589	1,657	2,458	2,755	43.84	40.71	31.09	28.60	61.82	62.65	83.93	88.78	1.02	0.94	1.51	1.56
Tonga	218	233	17	16	1.61	1.61	6.06	6.24	20.81	23.45	21.19	46.28	0.00	0.00	0.00	0.00

Table B3.1 *(continued)*
Competitive industrial performance, 2010 and 2015

	MVA per capita (constant 2010 $)		Manufactured exports per capita (current $)		Medium-high and high-tech MVA share in total manufacturing (percent, current $)		Share of MVA in GDP (percent, constant 2010 $)		Medium- and high-tech manufactured exports share in total manufactured exports (percent, current $)		Manufactured exports share in total exports (percent, current $)		Impact of a country world MVA (percent, constant 2010 $)		Impact of a country on world manufactures trade (percent, current $)	
Country	**2010**	**2015**	**2010**	**2015**	**2010**	**2015**	**2010**	**2015**	**2010**	**2015**	**2010**	**2015**	**2010**	**2015**	**2010**	**2015**
Trinidad and Tobago	3,163	2,739	5,564	5,564	39.60	39.60	19.97	17.22	17.70	17.70	73.95	73.95	0.04	0.03	0.07	0.07
Tunisia	684	683	1,275	1,125	20.01	20.01	16.53	16.22	45.02	47.37	82.59	89.97	0.07	0.06	0.12	0.11
Turkey	1,577	1,814	1,381	1,549	32.32	29.86	15.60	15.76	42.50	41.79	87.71	84.71	1.10	1.19	0.92	1.01
Uganda	56	55	12	16	11.07	11.07	9.45	8.67	15.16	17.08	34.83	36.02	0.02	0.02	0.00	0.01
Ukraine	405	342	964	609	32.74	30.36	13.12	12.27	43.25	37.56	85.57	71.59	0.18	0.13	0.41	0.23
United Arab Emirates	3,091	3,572	1,854	3,630	12.61	12.61	9.00	8.93	27.07	19.58	10.45	12.17	0.25	0.27	0.14	0.28
United Kingdom	3,556	3,509	5,174	5,541	49.74	47.37	9.29	8.53	63.23	68.99	76.89	76.90	2.15	1.89	2.99	2.99
United States	5,906	6,073	2,783	3,000	47.69	41.17	12.20	11.75	64.75	65.29	76.84	75.05	17.64	16.27	7.94	8.04
Uruguay	1,615	1,653	795	926	13.80	15.29	13.53	11.80	23.92	26.26	39.91	41.44	0.05	0.05	0.02	0.03
Venezuela, Bolivarian Republic of	1,755	1,562	752	427	34.28	34.28	12.92	12.31	8.11	9.65	32.55	14.70	0.49	0.40	0.20	0.10
Viet Nam	236	337	567	1,469	25.43	40.36	17.94	20.34	27.99	49.25	69.30	84.74	0.20	0.26	0.46	1.14
Yemen	111	66	25	5	2.37	2.06	8.45	8.64	6.12	35.48	9.45	33.55	0.03	0.01	0.01	0.00
Zambia	115	126	101	67	21.08	21.08	7.90	7.66	14.33	30.00	19.55	15.47	0.02	0.02	0.01	0.01

Note: All values for world manufacturing value added (MVA) are in constant 2010 $, and values for world manufactures trade are in current $. GDP is gross domestic product. Technology classification is based on Annex C3, Tables C3.1 and C3.2.
Source: UNIDO elaboration based on the Competitive Industrial Performance Index 2017 database (UNIDO 2017b).

Annex C
General annexes

Annex C1 Country and economy groups

Table C1.1
Countries and economies by region

AFRICA				
Central Africa				
Cameroon	Chad	Equatorial Guinea	São Tomé and Principe	
Central African Republic	Congo, Republic of the	Gabon		
Eastern Africa				
Burundi	Djibouti	Ethiopia	Réunion	Somalia
Comoros	Eritrea	Kenya	Rwanda	Uganda
North Africa				
Algeria	Libya	South Sudan	Tunisia	
Egypt	Morocco	Sudan		
Southern Africa				
Angola	Lesotho	Mauritius	Seychelles	Tanzania, United Republic of
Botswana	Madagascar	Mozambique	South Africa	Zambia
Congo, Dem. Republic of the	Malawi	Namibia	Swaziland	Zimbabwe
Western Africa				
Benin	Gambia	Liberia	Nigeria	
Burkina Faso	Ghana	Mali	Senegal	
Cabo Verde	Guinea	Mauritania	Sierra Leone	
Côte d'Ivoire	Guinea-Bissau	Niger	Togo	
AMERICAS				
Latin America				
Caribbean				
Anguilla	British Virgin Islands	Dominican Republic	Martinique	Saint Vincent and the Grenadines
Antigua and Barbuda	Cayman Islands	Grenada	Montserrat	Trinidad and Tobago
Aruba	Cuba	Guadeloupe	Puerto Rico	United States Virgin Islands
Bahamas	Curaçao	Haiti	Saint Kitts and Nevis	
Barbados	Dominica	Jamaica	Saint Lucia	
Central America				
Belize	El Salvador	Honduras	Nicaragua	
Costa Rica	Guatemala	Mexico	Panama	
South America				
Argentina	Chile	French Guiana	Peru	Venezuela, Bolivarian Republic of
Bolivia, Plurinational State of	Colombia	Guyana	Suriname	
Brazil	Ecuador	Paraguay	Uruguay	

Table C1.1 *(continued)*
Countries and economies by region

North America				
North America				
Bermuda	Canada	Greenland	United States	
ASIA AND PACIFIC				
Central Asia				
Kazakhstan	Mongolia	Turkmenistan		
Kyrgyzstan	Tajikistan	Uzbekistan		
East Asia				
China	Korea, Republic of	Macao SAR, China	Singapore	
Hong Kong SAR, China	Japan	Malaysia	Taiwan Province of China	
South Asia				
Afghanistan	Bhutan	Maldives	Pakistan	
Bangladesh	India	Nepal	Sri Lanka	
South East Asia				
Brunei Darussalam	Indonesia	Myanmar	Thailand	
Cambodia	Lao People's Dem. Republic	Philippines	Viet Nam	
West Asia				
Armenia	Iraq	Lebanon	State of Palestine	
Azerbaijan	Israel	Oman	Syrian Arab Republic	
Bahrain	Jordan	Qatar	United Arab Emirates	
Iran, Islamic Republic of	Kuwait	Saudi Arabia	Yemen	
Other Asia and Pacific				
American Samoa	French Polynesia	Marshall Islands	Palau	Tonga
Australia	Guam	Micronesia, Federated States of	Papua New Guinea	Tuvalu
Cook Islands	Kiribati	New Caledonia	Solomon Islands	Vanuatu
Fiji	Korea, Dem. People's Republic of	New Zealand	Timor-Leste	
EUROPE				
European Union[a]				
Austria	Finland	Italy	Portugal	United Kingdom
Belgium	France	Lithuania	Slovakia	
Czechia	Germany	Luxembourg	Slovenia	
Denmark	Hungary	Malta	Spain	
Estonia	Ireland	Netherlands	Sweden	
Other European				
Albania	Croatia	Latvia	Montenegro	San Marino
Andorra	Cyprus	Liechtenstein	Norway	Serbia
Belarus	Georgia	Macedonia, Former Yugoslav Republic of	Poland	Switzerland
Bosnia and Herzegovina	Greece	Moldova, Republic of	Romania	Turkey
Bulgaria	Iceland	Monaco	Russian Federation	Ukraine

a. Excluding non-industrialized EU economies.
Source: UNIDO elaboration based on UNIDO (2017e).

Table C1.2
Countries and economies by industrialization level

INDUSTRIALIZED ECONOMIES				
Aruba	Denmark	Ireland	Monaco	Slovenia
Andorra	Estonia	Israel	Netherlands	Spain
Australia	Finland	Italy	New Caledonia	Sweden
Austria	France	Japan	New Zealand	Switzerland
Bahrain	French Guiana	Korea, Republic of	Norway	Taiwan Province of China
Belgium	French Polynesia	Kuwait	Portugal	United Arab Emirates
Bermuda	Germany	Liechtenstein	Puerto Rico	United Kingdom
British Virgin Islands	Greenland	Lithuania	Qatar	United States
Canada	Guam	Luxembourg	Russian Federation	United States Virgin Islands
Cayman Islands	Hong Kong SAR, China	Macao SAR, China	San Marino	
Curaçao	Hungary	Malaysia	Singapore	
Czechia	Iceland	Malta	Slovakia	
DEVELOPING AND EMERGING INDUSTRIAL ECONOMIES				
Emerging industrial economies				
Argentina	Colombia	Kazakhstan	Romania	Turkey
Belarus	Costa Rica	Latvia	Saudi Arabia	Ukraine
Brazil	Croatia	Macedonia, Former Yugoslav Republic of	Serbia	Uruguay
Brunei Darussalam	Cyprus	Mauritius	South Africa	Venezuela, Bolivarian Republic of
Bulgaria	Greece	Mexico	Suriname	
Chile	India	Oman	Thailand	
China	Indonesia	Poland	Tunisia	
Other developing economies				
Albania	Cook Islands	Guyana	Mongolia	Saint Lucia
Algeria	Côte d'Ivoire	Honduras	Montenegro	Saint Vincent and the Grenadines
Angola	Cuba	Iran, Islamic Republic of	Montserrat	Seychelles
Anguilla	Dominica	Iraq	Morocco	Sri Lanka
Antigua and Barbuda	Dominican Republic	Jamaica	Namibia	State of Palestine
Armenia	Ecuador	Jordan	Nicaragua	Swaziland
Azerbaijan	Egypt	Kenya	Nigeria	Syrian Arab Republic
Bahamas	El Salvador	Korea, Dem. People's Republic of	Pakistan	Tajikistan
Barbados	Equatorial Guinea	Kyrgyzstan	Palau	Tonga
Belize	Fiji	Lebanon	Panama	Trinidad and Tobago
Bolivia, Plurinational State of	Gabon	Libya	Papua New Guinea	Turkmenistan
Bosnia and Herzegovina	Georgia	Maldives	Paraguay	Uzbekistan
Botswana	Ghana	Marshall Islands	Peru	Viet Nam
Cabo Verde	Grenada	Martinique	Philippines	Zimbabwe
Cameroon	Guadeloupe	Micronesia, Federated States of	Réunion	
Congo, Republic of the	Guatemala	Moldova, Republic of	Saint Kitts and Nevis	

Table C1.2 *(continued)*
Countries and economies by industrialization level

Least developed countries				
Afghanistan	Congo, Dem. Republic of the	Lesotho	Rwanda	Timor-Leste
Bangladesh	Djibouti	Liberia	Samoa	Togo
Benin	Eritrea	Madagascar	São Tomé and Principe	Tuvalu
Bhutan	Ethiopia	Malawi	Senegal	Uganda
Burkina Faso	Gambia	Mali	Sierra Leone	Vanuatu
Burundi	Guinea	Mauritania	Solomon Islands	Yemen
Cambodia	Guinea-Bissau	Mozambique	Somalia	Zambia
Central African Republic	Haiti	Myanmar	South Sudan	
Chad	Kiribati	Nepal	Sudan	
Comoros	Lao People's Dem. Republic	Niger	Tanzania, United Republic of	

Note: Industrialized economies include economies with adjusted manufacturing value added (MVA) per capita higher than 2,500 or a gross domestic product higher than 20,000 international PPP$ (PPP is purchasing power parity). Emerging industrial economies include economies with adjusted MVA per capita ranging between 1,000 and 2,500 or whose share of the world MVA is higher than 0.5 percent. The list of least developed countries is based on decisions of the United Nations General Assembly. All remaining economies are included in the group "other developing economies."
Source: UNIDO elaboration based on UNIDO (2017e).

Table C1.3
Countries and economies by income level

HIGH INCOME				
Andorra	Chile	Guam	Malta	Saudi Arabia
Anguilla	Croatia	Hong Kong SAR, China	Monaco	Singapore
Antigua and Barbuda	Curaçao	Iceland	Netherlands	Slovakia
Aruba	Cyprus	Ireland	New Caledonia	Slovenia
Australia	Czechia	Israel	New Zealand	Spain
Austria	Denmark	Italy	Norway	Sweden
Bahamas	Equatorial Guinea	Japan	Oman	Switzerland
Bahrain	Estonia	Korea, Republic of	Poland	Taiwan Province of China
Barbados	Finland	Kuwait	Portugal	Trinidad and Tobago
Belgium	France	Latvia	Puerto Rico	United Arab Emirates
Bermuda	French Polynesia	Liechtenstein	Qatar	United Kingdom
Brunei Darussalam	Germany	Lithuania	Russian Federation	United States
Canada	Greece	Luxembourg	Saint Kitts and Nevis	United States Virgin Islands
Cayman Islands	Greenland	Macao SAR, China	San Marino	Uruguay

Table C1.3 *(continued)*
Countries and economies by income level

UPPER MIDDLE INCOME				
Albania	China	Iraq	Montenegro	Thailand
Algeria	Colombia	Jamaica	Namibia	Tonga
American Samoa	Costa Rica	Jordan	Palau	Tunisia
Angola	Cuba	Kazakhstan	Panama	Turkey
Argentina	Dominica	Lebanon	Peru	Turkmenistan
Azerbaijan	Dominican Republic	Libya	Romania	Tuvalu
Belarus	Ecuador	Macedonia, Former Yugoslav Republic of	Saint Lucia	Venezuela, Bolivarian Republic of
Belize	Fiji	Malaysia	Saint Vincent and the Grenadines	
Bosnia and Herzegovina	Gabon	Maldives	Serbia	
Botswana	Grenada	Marshall Islands	Seychelles	
Brazil	Hungary	Mauritius	South Africa	
Bulgaria	Iran, Islamic Republic of	Mexico	Suriname	
LOWER MIDDLE INCOME				
American Samoa	El Salvador	Lao People's Dem. Republic	Papua New Guinea	Swaziland
Armenia	Georgia	Lesotho	Philippines	Syrian Arab Republic
Bhutan	Ghana	Mauritania	Paraguay	Timor-Leste
Bolivia, Plurinational State of	Guatemala	Micronesia, Federated States of	São Tomé and Principe	Ukraine
Cabo Verde	Guyana	Moldova, Republic of	Senegal	Uzbekistan
Cameroon	Honduras	Mongolia	Solomon Islands	Vanuatu
Congo, Republic of the	India	Morocco	South Sudan	Viet Nam
Côte d'Ivoire	Indonesia	Nicaragua	Sri Lanka	Yemen
Djibouti	Kiribati	Nigeria	State of Palestine	Zambia
Egypt	Kyrgyzstan	Pakistan	Sudan	
LOW INCOME				
Afghanistan	Chad	Guinea-Bissau	Mali	Somalia
Bangladesh	Comoros	Haiti	Mozambique	Tajikistan
Benin	Congo, Dem. Republic of the	Kenya	Myanmar	Tanzania, United Republic of
Burkina Faso	Eritrea	Korea, Dem. People's Republic of	Nepal	Togo
Burundi	Ethiopia	Liberia	Niger	Uganda
Cambodia	Gambia	Madagascar	Rwanda	Zimbabwe
Central African Republic	Guinea	Malawi	Sierra Leone	

Source: UNIDO elaboration based on UNIDO (2017e).

Annex C2 Classification of manufacturing sectors in various sources

Table C2.1
Classification of manufacturing sectors, ISIC Rev.3

ISIC code rev. 3	Description
15	Manufacture of food products and beverages
16	Manufacture of tobacco products
17	Manufacture of textiles
18	Manufacture of wearing apparel; dressing and dyeing of fur
19	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear
20	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
21	Manufacture of paper and paper products
22	Publishing, printing and reproduction of recorded media
23	Manufacture of coke, refined petroleum products and nuclear fuel
24	Manufacture of chemicals and chemical products
25	Manufacture of rubber and plastics products
26	Manufacture of other non-metallic mineral products
27	Manufacture of basic metals
28	Manufacture of fabricated metal products, except machinery and equipment
29	Manufacture of machinery and equipment n.e.c.
30	Manufacture of office, accounting and computing machinery
31	Manufacture of electrical machinery and apparatus n.e.c.
32	Manufacture of radio, television and communication equipment and apparatus
33	Manufacture of medical, precision and optical instruments, watches and clocks
34	Manufacture of motor vehicles, trailers and semi-trailers
35	Manufacture of other transport equipment
36	Manufacture of furniture; manufacturing n.e.c.
37	Recycling

Note: ISIC is International Standard Industrial Classification; n.e.c. is not elsewhere classified.
Source: UNIDO elaboration based on UNSD (n.d. a)

Table C2.2
Classification of manufacturing sectors, Eora Multi-Regional Input-Output Database

Correspondence for ISIC code rev. 3	Description
01t02	Agriculture, hunting and forestry
05	Fishing
10t14	Mining and quarrying
15t37	Manufacturing
15t16	*Food and beverages*
17t19	*Textiles and wearing apparel*
20t22	*Wood and paper*
23t26	*Petroleum, chemical and non-metallic mineral products*
27t28	*Metal products*
29t33	*Electrical and machinery*
34t35	*Transport equipment*
36	*Other manufacturing*
37	*Recycling*
40t41	Electricity, gas and water
45	Construction
50	Maintenance and repair
51	Wholesale trade
52	Retail trade
55	Hotels and restaurants
60t63	Transport
64	Post and telecommunications
65t74	Financial intermediation and business activities
75	Public administration
80t93	Education, health and other services
95	Private households
99	Others

Note: ISIC is International Standard Industrial Classification. Correspondence for ISIC Rev. 3 is based on Lenzen et al. (2013).
Source: UNIDO elaboration based on Lenzen et al. (2012).

Table C2.3
Classification of manufacturing sectors, OECD Inter-Country Input-Output Database, 2016 edition

Correspondence for ISIC code rev. 3	Description
01t02, 05	Agriculture, hunting, forestry and fishing
10t14	Mining and quarrying
15t37	Manufacturing
15t16	*Food products, beverages and tobacco*
17t19	*Textiles, textile products, leather and footwear*
20	*Wood and products of wood and cork*
21t22	*Pulp, paper, paper products, printing and publishing*
23	*Coke, refined petroleum products and nuclear fuel*
24	*Chemicals and chemical products*
25	*Rubber and plastics products*
26	*Other non-metallic mineral products*
27	*Basic metals*
28	*Fabricated metal products*
29	*Machinery and equipment, n.e.c .*
30, 32t33	*Computer, Electronic and optical equipment*
31	*Electrical machinery and apparatus, n.e.c.*
34	*Motor vehicles, trailers and semi-trailers*
35	*Other transport equipment*
36t37	*Manufacturing n.e.c.; recycling*
40t41	Electricity, gas and water supply
45	Construction
50t52	Wholesale and retail trade; repairs
55	Hotels and restaurants
60t63	Transport and storage
64	Post and telecommunications
65t67	Financial intermediation
70	Real estate activities
71	Renting of machinery and equipment
72	Computer and related activities
73t74	Research and development and other business activities
75	Public admininstration and defence; compulsory social security
80	Education
85	Health and social work
90t93	Other community, social and personal services
95	Private households with employed persons

Note: ISIC is International Standard Industrial Classification; n.e.c. is not elsewhere classified. Correspondence for ISIC Rev. 3 is based on OECD (2017c).
Source: UNIDO elaboration based on OECD (2017c).

Annex C3 Classification of manufacturing sectors by technology group

Table C3.1
Technology classification of medium- and high-tech manufacturing exports

Standard International Trade Classification Rev. 3 codes of medium- and high-tech exports
266t267
512t513, 525, 533, 541t542, 553t554, 562, 571t575, 579, 581t583, 591, 593, 597, 598
653, 671t672, 678
711t714, 716, 718, 721t728, 731, 733, 735, 737, 741t749, 751t752, 759, 761t764, 771t776, 778, 781t786, 791t793
811t813, 871t874, 881t882, 884t885, 891

Source: UNIDO elaboration based on UNIDO (2017c).

Table C3.2
Technology classification of manufacturing sectors

International Standard Industrial Classification Rev. 3	Description	Technology group
2423	Manufacture of pharmaceuticals, medicinal chemicals and botanical products	High-tech
30	Manufacture of office, accounting and computing machinery	High-tech
32	Manufacture of radio, television and communication equipment and apparatus	High-tech
33	Manufacture of medical, precision and optical instruments, watches and clocks	High-tech
353	Manufacture of aircraft and spacecraft	High-tech
24 excl. 2423	Manufacture of chemicals and chemical products (excluding pharmaceuticals, medicinal chemicals and botanical products)	Medium-high-tech
29	Manufacture of machinery and equipment n.e.c.	Medium-high-tech
31	Manufacture of electrical machinery and apparatus n.e.c.	Medium-high-tech
34	Manufacture of motor vehicles, trailers and semi-trailers	Medium-high-tech
352	Manufacture of railway and tramway locomotives and rolling stock	Medium-high-tech
359	Manufacture of transport equipment n.e.c.	Medium-high-tech
23	Manufacture of coke, refined petroleum products and nuclear fuel	Medium-low-tech
25	Manufacture of rubber and plastics products	Medium-low-tech
26	Manufacture of other non-metallic mineral products	Medium-low-tech
27	Manufacture of basic metals	Medium-low-tech
28	Manufacture of fabricated metal products, except machinery and equipment	Medium-low-tech
351	Building and repairing of ships and boats	Medium-low-tech
15	Manufacture of food products and beverages	Low-tech
16	Manufacture of tobacco products	Low-tech
17	Manufacture of textiles	Low-tech
18	Manufacture of wearing apparel; dressing and dyeing of fur	Low-tech
19	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear	Low-tech
20	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	Low-tech
21	Manufacture of paper and paper products	Low-tech
22	Publishing, printing and reproduction of recorded media	Low-tech
36	Manufacture of furniture; manufacturing n.e.c.	Low-tech
37	Recycling	Low-tech

Note: N.e.c. is not elsewhere classified.
Source: OECD (2011b).

Annex C4 Classification of manufacturing consumption goods

Table C4.1
Classification of individual consumption of manufacturing goods

Description	Consumption goods
Food and non-alcoholic beverages	1.1 Food; 1.2 Non-alcoholic beverages.
Alcoholic beverages, tobacco and narcotics	2.1 Alcoholic beverages; 2.2 Tobacco; 2.3 Narcotics.
Clothing and footwear	3.1.1 Clothing materials; 3.1.2 Garments; 3.1.3 Other articles of clothing and clothing accessories; 3.2.1 Shoes and other footwear.
Furnishings, household equipment and routine household maintenance	5.1.1 Furniture and furnishings; 5.1.2 Carpets and other floor coverings; 5.2 Household textiles; 5.3.1 Major household appliances whether electric or not; 5.3.2 Small electric household appliances; 5.4 Glassware, tableware and household utensils; 5.5 Tools and equipment for house and garden; 5.6.1 Non-durable household goods.
Health	6.1 Medical products, appliances and equipment (6.1.1 Pharmaceutical products; 6.1.2 Other medical products; 6.1.2 Therapeutic appliances and equipment (includes the repair of such articles (S)).
Transport	7.1 Purchase of vehicles (7.1.1 Motor cars; 7.1.2 Motorcycles; 7.1.3 Bicycles; 7.1.4 Animal drawn vehicles); 7.2.2 Fuels and lubricants for personal transport equipment .
Communication	8.2 Telephone and telefax equipment (includes repair of such equipment (S)).
Recreation and culture	9.1 Audio-visual, photographic and information processing equipment (excludes repair of such equipment (S)); 9.2.1 Major durables for outdoor recreation; 9.2.2 Musical instruments and major durables for indoor recreation; 9.3 Other recreational items and equipment, gardens and pets (excludes Veterinary and other services for pets (S)); 9.5 Newspapers, books and stationery.
Miscellaneous goods and services	12.1.3 Other appliances, articles and products for personal care; 12.3.1 Jewellery, clocks and watches (includes repair of such articles (S)); 12.3.2 Other personal effects (includes repair of such articles (S)).

Note: Items denoted by the letter (S) are services. Codes in the column *Consumption goods* correspond to Classification of Individual Consumption According to Purpose.
Source: UNIDO elaboration based on UNSD (n.d. b) and Duarte (2017).

Annex C5 Classification of manufacturing sectors by final use of their products

Table C5.1
Sectors producing consumer, intermediate, other investment and high-tech products

Category	ISIC code, rev. 3	Description
Final consumption goods	15	Manufacture of food products and beverages
	16	Manufacture of tobacco products
	17	Manufacture of textiles
	18	Manufacture of wearing apparel; dressing and dyeing of fur
	19	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear
	34	Manufacture of motor vehicles, trailers and semi-trailers
	36	Manufacture of furniture; manufacturing n.e.c.
	37	Recycling
Intermediate goods	20	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
	21	Manufacture of paper and paper products
	22	Publishing, printing and reproduction of recorded media
	23	Manufacture of coke, refined petroleum products and nuclear fuel
	24	Manufacture of chemicals and chemical products
	25	Manufacture of rubber and plastics products
	26	Manufacture of other non-metallic mineral products
	27	Manufacture of basic metals
	28	Manufacture of fabricated metal products, except machinery and equipment
Other investment goods	35	Manufacture of other transport equipment
	29	Manufacture of machinery and equipment n.e.c.
Electronics-related high-tech investment goods	30	Manufacture of office, accounting and computing machinery
	31	Manufacture of electrical machinery and apparatus n.e.c.
	32	Manufacture of radio, television and communication equipment and apparatus
	33	Manufacture of medical, precision and optical instruments, watches and clocks

Note: Sector classification based on ISIC Rev. 3, UNSD (n.d. a). The products of some sectors can fall in more than one category. This classification indicates the most extended uses but not necessarily the only ones.
Source: Lewis and Peng (2017).

Annex D
Data appendix

Annex D1 Data guide

Table D1.1
Figures, tables and datasets based on background papers prepared for *Industrial Development Report (IDR) 2018*

Reference	Datasets used to produce the background papers (not necessarily for the figures and tables of *IDR 2018*)	Corresponding figures or tables in *IDR 2018*
Bykova et al. 2017	• BACI International Trade Database • The Trade Unit Value Database	Figures: 4.2, 4.14–4.15
de Macedo and Lavopa 2017	• Eora Multiregion Input-Output Database • OECD Inter-Country Input-Output Tables Database, Edition 2016	Figures: 3.1, 3.3–3.9
Duarte 2017	• World Bank International Comparison Program	Figure 1.6; Table C4.1
Foster-McGregor et al. 2017b	• BACI International Trade Database • The Trade Unit Value Database	Figures: 4.9.–4.13
Haider 2017	• OECD Inter-Country Input-Output Tables Database, Edition 2015 • Eora Multiregion Input-Output Database	Figures: 3.14, 3.15
Lewis and Peng 2017	• United Nations National Accounts Statistics Database • UNIDO INDSTAT 2, ISIC Rev. 3 Database	Figures: 2.13–2.14; Table C5.1
Mazzanti et al. 2017	• Eora Multiregion Input-Output Database • World Bank World Development Indicators Database	Figures: 5.6–5.10
Moneta and Stepanova 2017	• World Bank Global Consumption Database	Figures: 2.3–2.8, A2.1–A2.2; Table A1.1
Padilla 2017	• European Commission Eurobarometer • National Geographic and GlobeScan Greendex • OECD Database on Policy Instruments for the Environment • WU Global Material Flows Database • World Bank World Development Indicators Database	Figure 5.18
Pontoni and Bruschi 2017	• European Commission Eurobarometer • National Geographic and GlobeScan Greendex	Table 5.1

Table D1.2
Classifications used for producing *Industrial Development Report (IDR) 2018* figures and tables and their datasets

Classification	Type of classification used in *IDR 2018*	Reference in *IDR 2018*	Further information	Corresponding figures or tables in *IDR 2018*
Regional classification	Africa, Americas, Asia and Pacific and Europe	Upadhyaya 2013 and UNIDO 2017e	Annex C1, Table C1.1	Figures: 3.9, 4.3–4.9, 4.11, 4.13, 7.7–7.8; Tables: 7.1–7.2, 7.6–7.8, A3.1, B1.1–B1.7, B2.1–B2.4
Industrialization level classification	Industrialized economies, Emerging industrial economies, Other developing economies and Least developed countries	Upadhyaya 2013 and UNIDO 2017e	Annex C1, Table C1.2	Figures: 2.3, 2.8–2.9, 2.13–2.14, 2.16, 3.1, 3.3–3.9, 3.14, 4.2–4.9, 4.11, 4.13–4.15, 5.8, 7.1, 7.3–7.6, 7.9–7.10, 7.12–7.18, 7.20–7.21, Box 3.1 Figures 1–2; Tables: 7.1–7.2, 7.4–7.7, A2.1–A2.2, A3.1, B2.1–B2.4
Income classification	High, Upper-middle, Lower-middle and Low income	UNIDO 2017e	Annex C1, Table C1.3	Figure 5.11; Tables: 7.1–7.2, 7.6–7.8, B1.1–B1.7, B2.1–B2.4
	Higher, Middle, Low and Lowest income	World Bank 2014	Figure 2.2 and Annex A1, Table A1.1	Figures: 2.3–2.4, 2.6, 3.18, A2.1–A2.2
Sector classification	ISIC Rev. 3 (23 manufacturing sectors)	UNSD n.d. a	Annex C2, Table C2.1	Figures: 2.12, 4.10, 4.12; Tables: 7.4–7.5
	Eora Multiregion Input-Output Database (25 sectors, 9 manufacturing sectors)	Lenzen et al. 2012 and 2013	Annex C2, Table C2.2	Figures: 1.6, 3.1–3.13, 3.15, 5.6–5.7, 5.9–5.10
	OECD Inter-Country Input-Output Database (34 sectors, 16 manufacturing sectors)	OECD 2017c	Annex C2, Table C2.3	Figure 1.6; Tables: 3.1–3.2
Technology classification of medium- and high-tech manufacturing exports	Medium- and high-tech	UNIDO 2017c	Annex C3, Table C3.1	Table B3.1
Technology classification of manufacturing sectors	High-, medium-high-, medium-low- and low-tech	OECD 2011b	Annex C3, Table C3.2	Figures: 4.14–4.15, 7.10, 7.19, 7.21; Tables: 7.6, B1.1–B1.5, B2.2–B2.4, B3.1
Classification of individual consumption of manufacturing consumption goods	9 Consumption good categories	UNSD n.d. b and Duarte 2017	Annex C4, Table C4.1	Figures: 1.6, 2.1, 2.4–2.8, 3.12, 3.16–3.19, A2.1–A2.2, Box 3.1 Figures 1–2
Classification of manufacturing sectors by final use of their products	Consumer, Intermediate, Other investment and high-tech products	Lewis and Peng 2017	Annex C5, Table C5.1	Figure 2.14

Table D1.3
List of datasets used for production *Industrial Development Report (IDR) 2018* figures and tables

Dataset		Description	Reference in *IDR 2018*	Corresponding figures and tables in *IDR 2018*
Eora Multiregion Input-Output (MRIO) Database		The Eora MRIO database provides a time series of high resolution input-output tables with matching environmental and social satellite accounts for 187 countries (represented by a total of 15,909 sectors) for the period 1990–2012. For more information please see: http://worldmrio.com	Lenzen et al. 2012 and Lenzen et al. 2013	Figures: 1.6, 3.1, 3.13–3.15, 5.6–5.10; Table C2.2
Euromonitor International		Euromonitor International Passport Database is a global market research database providing detailed data and analysis on industries, economies, countries and consumers across 781 cities, 210 countries and markets and 27 industries. For more information please see: www.euromonitor.com/	Euromonitor International (Economies and Consumers; Possession of Household Durables, 2016)	Figures: 2.9–2.11, 2.16–2.17
Eurostat		Eurostat provides statistical information and covers all areas of European society with over 4,600 datasets, containing more than 1.2 billion statistical data values. For more information please see: http://ec.europa.eu/eurostat/web/main/home	Eurostat 2016	Figures: 3.16–3.17, 3.19
Global Footprint Network	National Footprint Accounts	National Footprint Accounts measure the ecological resource use and resource capacity of nations over time. Based on approximately 15,000 data points per country per year, the accounts calculate the footprints of more than 200 countries, territories, and regions from 1961 to the present. For more information please see: www.footprintnetwork.org/resources/data/	Global Footprint Network 2017a	Figure 5.3
Global Material Flows Database		The Global Material Flow database comprehensively comprises data on the extraction of a large number of different raw materials in annual time series, following the accounting standards of economy-wide material flow accounting as developed by Eurostat and the OECD. The database is set up and administrated by the Vienna University of Economics and Business and covers more than 200 countries, the time period of 1980 to 2013, and more than 300 different materials aggregated into 12 categories. For more information please see: www.materialflows.net	WU 2015	Figure 5.18
International Energy Agency and Organisation for Economic Co-operation and Development (OECD)	World Energy Statistics	The World Energy Statistics online data service contains key energy statistics for over 150 countries and regions. Data are provided in original units for the different types of coal, oil, natural gas, renewables and waste, as well as for electricity and heat. Data are available from 1971 (1960 for OECD countries) onwards. For more information please see: https://www.iea.org/statistics/relateddatabases/worldenergystatistics/	World Energy Statistics and Balances © OECD/IEA 2017, www.iea.org/statistics. Licence: www.iea.org/t&c; as modified by UNIDO.	Figures: 7.22–7.25

Table D1.3 *(continued)*
List of datasets used for production *Industrial Development Report (IDR) 2018* figures and tables

Dataset		Description	Reference in *IDR 2018*	Corresponding figures and tables in *IDR 2018*
International Labour Organization Databases	Trends Econometric Models	The Trends Econometric Models database is used to produce estimates and projections of unemployment, employment, employment by industry and broad occupational group,status in employment and labour productivity. The output of the model is a complete matrix of data for 188 countries. For more information please see: www.ilo.org/ilostat-files/Documents/ILO%20estimates%20and%20projections%20methodological%20note.pdf	ILO 2016	Figures: 1.2–1.3, 7.11–7.16
	Key Indicators of the Labour Market (KILM), Edition 8 and 9	KILM 2015 offers data for over 200 countries and the 17 KILM indicators provide detailed information related to 36 data tables, including indicators on employment (occupation, status, sector, hours, etc.), labour underutilization and the characteristics of job seekers, education, wages, labour productivity and working poverty. For more information please see: www.ilo.org/global/statistics-and-databases/research-and-databases/kilm/lang--en/index.htm	Key Indicators of the Labour Market (2013 and 2015)	Figures: 1.2, 1.3, 7.11–7.16
National Geographic and GlobeScan	Greendex 2014	Greendex measures and monitors consumer progress toward environmentally sustainable behavior in 65 areas relating to housing, transportation, food and consumer goods. Greendex 2014 ranks average consumers in 18 countries—up from 14 in 2008 for which changes are tracked—according to the environmental impact of their discretionary and nondiscretionary consumption patterns within these four major categories. For more information please see: http://images.nationalgeographic.com/wpf/media-content/file/NGS_2014_Greendex_Highlights_FINAL-cb1411689730.pdf	National Geographic and GlobeScan 2014	Figures: 5.12, 5.19

Table D1.3 *(continued)*

List of datasets used for production *Industrial Development Report (IDR) 2018* figures and tables

Dataset		Description	Reference in *IDR 2018*	Corresponding figures and tables in *IDR 2018*
National Statistics	National Bureau of Statistics of China	The National Bureau of Statistics of China is in charge of statistics and economic accounting in China. For more information please see: www.stats.gov.cn/english/	National Bureau of Statistics of China 2016	Figure 3.17
	U.S. Bureau of Labor Statistics	The Bureau of Labor Statistics of the U.S. Department of Labor is the principal federal agency responsible for measuring labor market activity, working conditions, and price changes in the economy. For more information please see: https://www.bls.gov/	U.S. Bureau of Labor Statistics 2017	Figure 3.16
	Japan Statistics Bureau, Ministry of Internal Affairs and Communications	The Statistics Bureau is responsible for planning and executing major censuses and statistical surveys and compiling and disseminating statistical information. For more information please see: www.stat.go.jp/english/	Japan Statistics Bureau, Ministry of Internal Affairs and Communications website (www.stat.go.jp/english/data/cpi/1588.htm#his), 2017	Figure 3.16
	National Institute of Statistics and Geography of Mexico	The Institute of Statistics and Geography is an autonomous public body responsible for regulating and coordinating the National Statistical System and Geographic Information, as well as to capture and disseminate information of Mexico in terms of territory, resources, population and economy. For more information please see: www.beta.inegi.org.mx/	National Institute of Statistics and Geography of Mexico, Prices Indices 2017,	Figure 3.17
	Statistics South Africa	Statistics South Africa is the national statistical service of South Africa. For more information please see: www.statssa.gov.za/	Statistics South Africa 2017	Figure 3.17
Organisation for Economic Co-operation and Development (OECD) Databases	OECD Inter-Country Input-Output Tables (ICIOTs) database, 2016 Edition	The OECD ICIOTs database describe the sale and purchase relationships between producers and consumers within an economy. The latest set of IOTs presents matrices of inter-industrial flows of goods and services in current prices ($ million), for all OECD countries and 28 non-member economies, covering the years 1995 to 2011 . For more information please see: www.oecd.org/sti/ind/inter-country-input-output-tables.htm	OECD 2017c	Figure 1.6; Tables: 3.1–3.2

Table D1.3 *(continued)*
List of datasets used for production *Industrial Development Report (IDR) 2018* figures and tables

Dataset		Description	Reference in *IDR 2018*	Corresponding figures and tables in *IDR 2018*
UNIDO Statistics Databases	UNIDO INDSTAT 2, ISIC Rev. 3 Database	The INDSTAT2 database contains time series data on the manufacturing sector for the period 1963 onwards for 170 countries. The database contains eight principle indicators of industrial statistics, including the index numbers of industrial production, which show the real growth of the volume of production by 2-digit of ISIC Rev. 3. The data are arranged at the 2-digit level of the International Standard Industrial Classification of All Economic Activities revision 3 pertaining to the manufacturing sector, which comprises 23 industries. For more information please see: www.unido.org/en/resources/statistics/statistical-databases.html	UNIDO 2016 and 2017d	Figures: 2.12–2.14, 7.10; Tables: 7.4–7.6, B1.5
	Manufacturing Value Added (MVA) 2017 database	The MVA database contains country data for GDP, MVA and population for the period starting with 1990 to the latest year available. GDP and MVA data are given at current and constant prices (2005) in $. For more information please see: www.unido.org/en/resources/statistics/statistical-databases.html	UNIDO 2017f	Figures: 1.1, 1.3–1.5, 7.1–7.9, 7.16–7.17, 7.20, 7.23–7.25; Tables: 7.1–7.3, B1.1–B1.2, B1.4, B1.6, B1.8
	Competitive Industrial Performance (CIP) Index database, 2017 edition	UNIDO offers its CIP Index on stat.unido.org. The CIP index benchmarks national industrial performance of more than 110 countries using indicators of an economy's ability to produce and export manufactured goods competitively. For more information please see: www.unido.org/resources/statistics/statistical-databases.html?L=2	UNIDO 2017b	Figure 8.2; Tables: 8.2–8.6, B3.1
United Nations Commodity Trade Statistics (UN Comtrade) Database	United Nations Commodity Trade Statistics (UN Comtrade) database	UN Comtrade Database is a repository of official trade statistics and relevant analytical tables. It contains annual trade statistics starting from 1962 from over 170 reporter countries/areas. For more information please see: http://comtrade.un.org	UNSD 2016a and 2017	Figures: 5.11 7.18–7.21; Tables: 7.7–7.8, B1.1–B1.3, B1.5, B1.7, B2.1–B2.4
	BACI International Trade database	BACI is the world trade database developed by the CEPII and provides bilateral values and quantities of exports at the HS 6-digit product disaggregation, for more than 200 countries since 1995. Original data are provided by the United Nations Statistical Division (COMTRADE database). For more information please see www.cepii.fr/CEPII/en/bdd_modele/presentation.asp?id=1	Gaulier and Zignago 2010	Figures: 4.2–4.15; Table A3.1
	The Trade Unit Value Database (TUVD)	TUVD is a worldwide unit value database developed by the CEPII and contains Unit Value information (in $ per ton) over the period 2000-2015, with 182 reporters, 253 partners, and more than 5,000 product categories per year. Import and export unit values are provided at the 6-digits level of the Harmonized System. For more information please see: www.cepii.fr/CEPII/en/bdd_modele/presentation.asp?id=2	Berthou and Emlinger 2011	Figures: 4.2, 4.9–4.15
United Nations National Accounts Statistics Database	United Nations National Accounts Statistics	The National Accounts Statistics database contains detailed national accounts data for most countries and areas of the world. (Data availability varies across countries and fiscal years as not all UN member countries are able to provide a complete set of data.) For more information, please see: https://unstats.un.org/unsd/nationalaccount/madt.asp	UN 2015	Figure 2.13

Table D1.3 *(continued)*
List of datasets used for production *Industrial Development Report (IDR) 2018* figures and tables

Dataset		Description	Reference in *IDR 2018*	Corresponding figures and tables in *IDR 2018*
University of Groningen Growth and Development Centre Databases	Penn World Table Database (Version 7.1 and 9.0)	The Penn World Table database provides information on relative levels of income, output, input and productivity. The version 9.0 covers 182 countries between 1950 and 2014; and the version 7.1 includes 189 countries and territories for the period 1950-2010, and uses 2005 as the reference year. For more information please see: www.rug.nl/ggdc/productivity/pwt/	Heston et al. 2012 and Feenstra et al. 2015	Figures: 2.12, 3.10, 3.13
World Bank Databases	Global Consumption Database	The Global Consumption Database is a one-stop source of data on household consumption patterns in developing countries. The data are based on national household surveys, which collect information for a group of households representative of the entire country. Four levels of consumption are used to segment the market in each country. For more information please see: http://datatopics.worldbank.org/consumption/AboutDatabase	World Bank 2014	Figures: 2.2–2.8, 3.18, A2.1–A2.2; Table A1.1
	World Development Indicators Database	The World Development Indicators Database offers global development data, and includes national, regional and global estimates. The database covers 217 economies and the years 1960–2016. For more information please see: http://data.worldbank.org/data-catalog/world-development-indicators	World Bank 2016b and 2017b	Figures: 2.1, 2.10, 2.12, 2.16–2.17, 5.9–5.11, 5.18; Table A3.1
	International Comparison Program (ICP) (2005 and 2011)	The ICP is a worldwide statistical initiative led by the World Bank under the auspices of the United Nations Statistical Commission, with the main objective of providing comparable price and volume measures of gross domestic product (GDP) and its expenditure aggregates among countries within and across regions. The set of 2011 ICP results contains data for 199 countries and covers overs 26 expenditures categories for goods and services, and several indicators including PPPs, expenditure shares of GDP, total and per capita expenditures in US dollar both in exchange rate terms and purchasing power parity (PPP) terms, and price level indices. The set of 2005 ICP results provides information for 146 economies on GDP, GDP per capita, household consumption, collective government consumption, and capital formation. For more information please see: www.worldbank.org/en/programs/icp#5	World Bank 2008 and 2015	Figures: 1.6, 2.1, 3.12–3.13, Box 3.1 Figures 1–2

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