

Globalization in transition

Kevin Sneader, Global Managing Partner, McKinsey & Company

The nature of globalization is a topic of intense discussion and debate. Although trade and tariff tensions have dominated recent headlines, important structural changes are underway that garner less attention.¹

The McKinsey Global Institute (MGI, the economics and business research arm of McKinsey & Company) has analyzed global value chains in 23 industries spanning 43 countries. The value chains analyzed account for 96 percent of global trade, 69 percent of global output, and 68 percent of global employment.²

One key shift we found is away from trade in goods and toward trade in services and data. Trade in services is growing faster than trade in goods, and already create more value. Another is that all global value chains are becoming more knowledge-intensive. The knowledge economy is now a defining feature of globalization.

Three factors explain these shifts: (1) growing demand in China and the rest of the developing world, which enables these countries to consume more of what they produce; (2) the development of more comprehensive domestic supply chains in

¹ This paper is a summary of the findings of January 2019 MGI research. See *Globalization in transition: The future of trade and value chains*, McKinsey Global Institute, January 2019.

² The analysis extends the World Input-Output Database to cover the years from 1995 to 2017. It also draws on dozens of interviews with industry experts, proprietary industry data, and national accounts data. This publication builds on previous MGI research on global flows and digital globalization. See *Digital globalization: The new era of global flows*, McKinsey Global Institute, February 2016; *Foreign Affairs*, April 2017; and *Global flows in a digital age: How trade, finance, people, and data connect the world economy*, McKinsey Global Institute, April 2014.

those countries, reducing their imports of intermediate goods; and (3) the growing impact of new technologies. On the latter, in the past digital technologies accelerated trade by reducing transaction costs, but their future impact is likely to be more complex, in some scenarios dampening trade in goods and fueling even more growth in services trade.

I. GLOBAL VALUE CHAINS FALL INTO SIX GROUPS WITH DIFFERENT CHARACTERISTICS AND TRADE PATTERNS

Global value chains reflect millions of decisions made by businesses regarding where to source inputs, where to establish production, and where to sell goods. These decisions shape the movement and volume of global flows of goods, services, finance, people, and data. The simplest value chains, in industries such as basic metals, involve a sequence of production steps that process inputs and raw commodities contributed by firms located in different countries. The most complex, such as those for electronics, automobiles, and aircraft, can involve hundreds of inputs from dozens of countries and subassembly of complex components.³

³ The literature on global value chains is extensive. See, for example, Marcel Timmer et al., *An anatomy of the global trade slowdown based on the WIOD 2016 release*, Groningen Growth and Development Centre, 2016; Koen De Backer and Sébastien Miroudot, *Mapping global value chains*, European Central Bank working paper number 1677, May 2014; *Global value chain development report 2017*, World Bank Group et al., 2017; *The changing nature of international production: Insights from trade in value added and related indicators*, Organisation for Economic Co-operation and Development (OECD), December 2018.

Services are also delivered through value chains.⁴ Two-thirds of world trade is in intermediate inputs, not final goods and services, underscoring the scale and intricacy of these cross-border production networks.

We group industry value chains into six archetypes: four in goods-producing industries and two in services (Exhibit 1). We classify them by their factor inputs, trade intensity, and country participation. These groupings highlight important differences in dynamics.

Exhibit 1

Global value chains are grouped into six archetypes based on their inputs, trade intensity, and country participation



Archetype	Global value chain	Labor intensity Labor compensation/gross value added (%)	Knowledge intensity % of highly skilled labor	Commodity intensity Commodity inputs as % of gross output	Regional trade % of total trade	Trade intensity Gross exports/gross output (%)	Country participation ² Number of countries representing 75% of total exports	Developing economy share of exports (%)	Gross output \$ trillion	Employment million
Global innovations	Chemicals	43	33	14	49	29	14	25	5.5	19
	Auto	58	28	7	59	29	13	30	4.5	29
	Computers and electronics	52	50	3	54	48	8	48	4.0	23
	Machinery and equipment	61	26	12	46	32	13	29	3.6	34
	Electrical machinery	60	31	18	52	30	14	45	2.4	16
	Transport equipment	61	28	8	35	38	12	26	1.5	10
	Average ³ or Total (% of global total)	56	33	10	49	34	12	34	21.5 (13)	131 (4)
Labor-intensive goods	Textiles and apparel	68	15	9	41	31	13	66	2.8	78
	Furniture and other manufacturing	65	23	10	42	25	17	58	2.5	23
	Average ³ or Total (% of global total)	67	19	9	41	28	15	62	5.3 (3)	101 (3)
Regional processing	Food and beverage	52	13	29	55	13	22	43	6.9	68
	Fabricated metal products	65	16	24	53	18	16	45	2.5	34
	Paper and printing	60	37	4	59	16	17	34	2.2	11
	Glass, cement, ceramics	59	15	18	56	10	16	51	2.0	33
	Rubber and plastics	60	16	6	57	23	16	42	1.8	23
	Average ³ or Total (% of global total)	59	19	16	56	16	17	43	15.3 (9)	169 (5)
Resource-intensive goods	Mining	40	22	72	31	30	16	73	6.0	21
	Agriculture	63	9	74	43	8	24	50	5.7	866
	Basic metals	57	15	70	46	20	21	42	4.5	24
	Energy	37	25	81	51	23	16	42	3.9	4
	Average ³ or Total (% of global total)	49	18	74	43	20	19	52	20.0 (12)	915 (28)
Labor-intensive services	Wholesale and retail trade	61	23	1	41	10	13	28	14.3	488
	Transport and storage	56	16	10	35	15	13	31	7.2	109
	Healthcare	83	36	1	41	1	8	49	6.5	145
	Average ³ or Total (% of global total)	67	25	4	39	9	11	36	28.0 (17)	742 (23)
Knowledge-intensive services	Professional services	68	56	1	38	10	13	18	10.9	52
	Financial intermediation	47	51	0.2	32	8	9	8	7.6	65
	IT services	67	56	0.3	26	18	13	37	2.1	36
	Average ³ or Total (% of global total)	61	54	1	32	12	12	21	20.6 (13)	153 (5)
Global average ³ or Total (% of global total covered by focus GVCs)		58	28	21	45	21	15	40	161 (69)	3,275 (68)

1 For the United States

2 Based on the balance of payments (with the exceptions of wholesale and retail trade as well as healthcare, which are based on the World Input-Output Database).

3 Arithmetic average.

⁴ Richard Baldwin and Anthony J. Venables, “Spiders and snakes: Offshoring and agglomeration in the global economy,” *Journal of International Economics*, December 2010, Volume 90, Number 2.

Global innovations. Industries including automotive, computers and electronics, and machinery have given rise to the most valuable, highly traded, and knowledge-intensive of all goods-producing value chains. They account for 13 percent of gross output but 35 percent of trade. They involve many sequential steps and intricate components that may require subassembly; in fact, just over half of all trade within these value chains is in intermediate goods rather than finished products. One-third of the workforce in these value chains is highly skilled, a share that is second only to knowledge-intensive services. Spending on R&D and intangible assets averages 30 percent of revenues, two to three times the figure in other value chains. Participation in these value chains is highly concentrated in a small set of advanced economies, although China's role is growing. On average, just 12 countries account for 75 percent of exports.

Labor-intensive goods. These value chains, including textiles and apparel, toys, shoes, and furniture, are highly labor- and trade-intensive. More than two-thirds of income goes to labor, most of which is low-skill. Given their light weight, the products in these industries are highly tradable, and 28 percent of global output is exported. Production shifted to developing countries in the last wave of globalization, and those countries today account for 62 percent of trade, a larger share than in any other archetype. Although these value chains are synonymous in many minds with "globalization," they represent only 3 percent of global gross output and employ only 3 percent of the global workforce (100 million people). China is the largest producer, but new manufacturing technologies and changes in demand are likely to shift country participation in the future.

Regional processing. Industries in this archetype include fabricated metals; rubber and plastics; glass, cement, and ceramics; and food and beverage. These value chains use relatively few intermediate goods. But with the exception of food and beverage, more than two-thirds of the output they produce becomes intermediate input feeding into other value chains, particularly global innovations. For instance, 82 percent of output in fabricated metal products and 74 percent of output in paper and printing are intermediate goods. The defining feature of regional processing is low tradability, due to the weight, bulk, or perishability of the goods produced. Production is therefore distributed around the world, with many countries (including developing economies) participating and a high share of intraregional trade (56 percent). However, trade is growing faster in these value chains than in the global innovations or labor-intensive goods archetypes. These value chains account for 9 percent of global gross output and employ 169 million people, or 5 percent of the global labor force. These value chains are often overlooked, given their relatively low value added per worker, but they are essential industries in all economies.

Resource-intensive goods. This archetype includes agriculture, mining, energy, and basic metals. These value chains generate \$20 trillion of gross output annually, nearly as much as global innovations value chains. Much of this output goes to other value chains as intermediate input. In the case of mining and basic metals, all output is intermediate goods. Access to natural resources and proximity to storage and transportation infrastructure determine where production is located. Countries around the world participate; 19 countries account for 75 percent of resource-intensive goods exports. The top five countries make up a lower share of exports in this group than in any other, at just 29 percent. While agriculture

employs almost 870 million people globally, the other value chains in this archetype employ only 49 million people in total, or 1.5 percent of the global workforce. Resource-intensive value chains contribute 11 percent of global value added, the highest share among all goods-producing value chains. Mining and energy have the highest value added per employee among all the value chains we studied.

Labor-intensive services. These value chains include retail and wholesale, transportation and storage, and healthcare. Given the in-person nature of these services, trade intensity is low, but trade is growing faster than in any other archetype. Trade in transportation services, for example, has increased with the rise of goods trade, tourism, and business travel; rising trade in wholesale and retail reflects the global expansion of retailers such as Carrefour and Walmart. These value chains are the largest job creators after agriculture, employing more than 740 million people (23 percent of the global workforce), two-thirds of whom are in wholesale and retail trade. While often overlooked by policy makers, these sectors are an important part of the economy in all countries. Their value added per employee is the same as in labor-intensive manufacturing (roughly \$25,000), and they employ seven times as many people.

Knowledge-intensive services. These high-value industries include professional services, financial intermediation, and IT services. More than half of the people employed in knowledge-intensive services have bachelor's degrees or above. Although they would seem to be inherently unconstrained by geography, these value chains have lower trade intensity than goods-producing industries, largely due to regulatory barriers. The trade flows that do occur span the entire

globe since costs are not directly related to distance. Country participation is highly concentrated in advanced economies; just 21 percent of all exports in this category come from developing economies, the lowest share among all types of value chains. The high concentration among countries reflects the significant investment in a skilled workforce and intangible assets required to succeed in these value chains.

II. FIVE MAJOR SHIFTS HAVE TRANSFORMED GLOBAL VALUE CHAINS OVER THE PAST DECADE

The 1990s and 2000s saw the expansion of complex value chains spanning the globe. But production networks are not immutable; they continue to evolve. We observe five major shifts in global value chains over the past decade.⁵

i. Goods-producing value chains have become less trade-intensive

Trade rose rapidly within nearly all global value chains from 1995 to 2007. More recently, trade intensity (that is, the ratio of gross exports to gross output) in almost all goods-producing value chains has fallen. Trade is still growing in absolute terms, but the share of output moving across the world's borders has fallen from 28.1 percent in 2007 to 22.5 percent in 2017. Trade volume growth has also slowed. Between 1990 and 2007, global trade volumes grew 2.1 times faster than real GDP on average, but they have grown only 1.1 times faster than GDP since 2011.⁶ The decline in trade intensity is especially pronounced in the most complex and highly traded value chains (Exhibit 2). However, this trend does not signal that

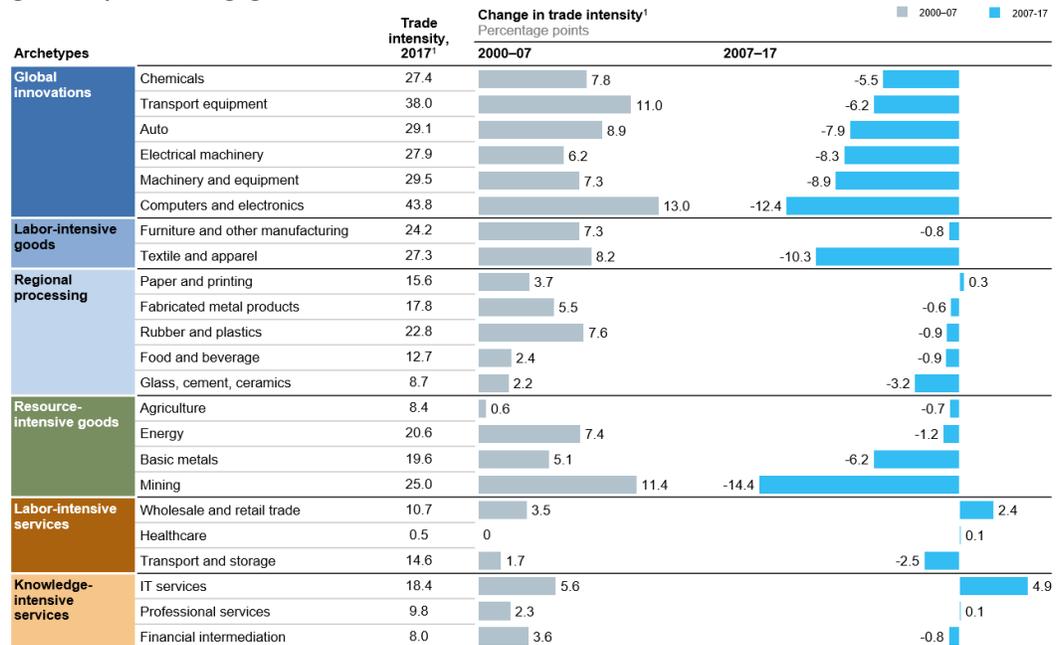
⁵ Throughout this report, we refer primarily to nominal trade and GDP values reflecting current exchange rates in dollars. These values embody both quantity and prices.

⁶ Trade volumes are measured by trade in real prices. See *World trade statistical review 2018*, World Trade Organization, 2018.

globalization is over. Rather, it reflects the development of China and other emerging economies, which are now consuming more of what they produce.

Exhibit 2

After increasing prior to 2007, trade intensity has since declined in almost all goods-producing global value chains.



¹ Trade intensity defined as gross exports as a percentage of gross output.

SOURCE: World Input-Output Database; McKinsey Global Institute analysis

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ii. Services are playing a growing role in global value chains that is often underappreciated and undervalued

In 2017, gross trade in services totaled \$5.1 trillion, a figure dwarfed by the \$17.3 trillion global goods trade. But trade in services has grown more than 60 percent faster than goods trade over the past decade. Some subsectors, including

telecom and IT services, business services, and intellectual property charges, are growing two to three times faster.

Yet the full role of services is obscured in traditional trade statistics. First, services create roughly one-third of the value that goes into traded manufactured goods.⁷ R&D, engineering, sales and marketing, finance, and human resources all enable goods to go to market. In addition, we find that imported services are substituting for domestic services in nearly all value chains. In the future, the distinction between goods and services will continue to blur as manufacturers increasingly introduce new types of leasing, subscription, and other “as a service” business models.⁸

Second, the intangible assets that multinational companies send to their affiliates around the world—including software, branding, design, operational processes, and other intellectual property developed at headquarters—represent tremendous value, but they often go unpriced and untracked unless captured as intellectual property charges.⁹ Years of R&D go into developing pharmaceuticals and smartphones, for example, while design and branding enable companies such as

⁷ Also see Sébastien Miroudot and Charles Cadestin, *Services in global value chains: From inputs to value-creating activities*, OECD Trade Policy Papers, number 197, March 2017; Aaditya Mattoo et al., *Trade in value added: Developing new measures of cross-border trade*, World Bank Group, 2013; Cecilia Heuser and Aaditya Mattoo, *Services trade and global value chains*, World Bank policy research working paper WPS8126, 2017.

⁸ “As a service” models replace one-time purchases of physical products with more distributed expenditures. See, for instance, Arul Elumalai, Irina Starikova, and Sid Tandon, “IT as a service: From build to consume,” *McKinsey Quarterly*, September 2016.

⁹ Some trade in intangible assets is captured in trade statistics through intellectual property charges. These flows are sometimes driven by decisions of multinationals on where to put ownership of these assets based on tax considerations. See Thomas Tørsløv, Ludvig Wier, and Gabriel Zucman, *The missing profits of nations*, NBER working paper number 24701, June 2018, revised August 2018; and OECD/G20 Base Erosion and Profit Shifting (BEPS) Project, final report, OECD, May 2015.

Nike and Adidas to charge a premium for their products.¹⁰ However, trade statistics do not capture the use of intangible assets in production and sales around the world.

Finally, trade statistics do not track soaring cross-border flows of free digital services, including email, real-time mapping, video conferencing, and social media. Wikipedia, for instance, encompasses 40 million free articles in roughly 300 languages. Every day, users worldwide watch more than a billion hours of YouTube's video content for free, and billions of people use Facebook and WeChat every month. These services undoubtedly create value for users, even without a monetary price.

We estimate that these three channels collectively produce up to \$8.3 trillion in value annually—a figure that would increase overall trade flows by \$4.0 trillion (or 20 percent) and reallocate another \$4.3 trillion currently counted as part of the flow of goods to services. If viewed this way, trade in services is already more valuable than trade in goods (Exhibit 3).¹¹

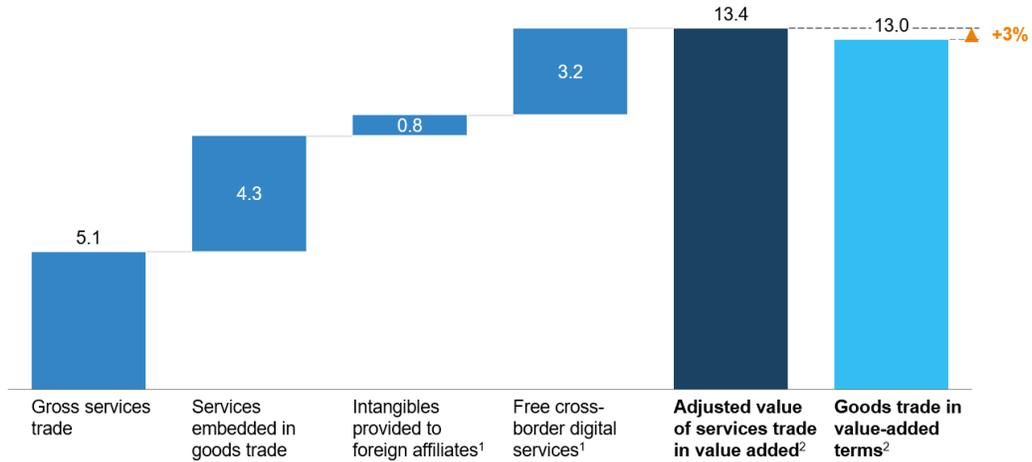
¹⁰ Carol A. Corrado and Charles R. Hulten, *Internationalization of intangibles*, Measuring the Effects of Globalization, Washington, DC, February 28, 2013.

¹¹ We remove the value of goods embedded in services trade and the value of services embedded in goods trade.

Exhibit 3

Taking into account the undermeasured aspects of service flows, services account for more than half of value added in overall trade.

\$ trillion, 2017



¹ Higher-end estimate.

² In value-added terms. The value of services embedded in goods trade and the value of goods embedded in services trade have been removed.

NOTE: Services embedded in goods trade defined as services value added in goods trade. Estimate of intangibles provided to foreign affiliates based on company-level data on foreign affiliate economic profit and expenses, adjusted for the share of revenue associated with intangibles produced by headquarters country. Estimate of free cross-border digital services based on the number of foreign users of global websites and the implied value of digital services (such as social media and messaging services).

SOURCE: Capital IQ, WTO, IMF, World Input-Output Database; Alexa Web Information Service; McKinsey Global Institute analysis

This perspective would also substantially shift the trade balance for some countries, most notably the United States. This exercise is not meant to argue for redefining national trade statistics. It simply underscores the underappreciated role of services, which will be increasingly important for how companies and countries participate in global value chains and trade in the future.

iii. Trade on the basis of arbitrage of labor costs is diminishing in some value chains

As global value chains expanded in the 1990s and early 2000s, many decisions about where to locate production were based on labor costs, particularly in industries producing labor-intensive goods and services. Yet counter to popular perceptions, today only 18 percent of goods trade is based on labor-cost arbitrage (defined as exports from countries whose GDP per capita is one-fifth or less than that of the importing country).¹² In other words, over 80 percent of today's global goods trade is not from a low-wage country to a high-wage country. Considerations other than low wages factor into company decisions about where to base production. These include access to skilled labor or natural resources, proximity to consumers, and the quality of infrastructure.

Moreover, the share of trade based on labor-cost arbitrage has been declining in some value chains, especially labor-intensive goods manufacturing (where it dropped from 55 percent in 2005 to 43 percent in 2017). This mainly reflects rising wages in developing countries. In the future, however, automation and AI may amplify this trend, transforming labor-intensive manufacturing into capital-intensive manufacturing. This shift will have important implications for how low-income countries participate in global value chains.

12 If we vary the ratio of GDP per capita of the exporter and importer from 2 to 10, we find that labor-cost arbitrage ranges from 5 to 30 percent of overall global trade.

iv. Global value chains are growing more knowledge-intensive

Intangibles are playing a bigger role in global value chains. In all value chains, capitalized spending on R&D and intangible assets such as brands, software, and intellectual property (IP) is growing as a share of revenue.¹³ Overall, it rose from 5.4 percent of revenue in 2000 to 13.1 percent in 2016. This trend is most apparent in global innovations value chains. Companies in machinery and equipment spend 36 percent of revenue on R&D and intangibles, while those in pharmaceuticals and medical devices average 80 percent. The growing emphasis on knowledge and intangibles favors countries with highly skilled labor forces, strong innovation and R&D capabilities, and robust intellectual property protections.¹⁴

In many value chains, value creation is shifting to upstream activities, such as R&D and design, and to downstream activities, such as distribution, marketing, and after-sales services. The share of value generated by the actual production of goods is declining (in part because offshoring has lowered the price of many goods).¹⁵ This trend is pronounced in pharmaceuticals and consumer electronics, which have seen the rise of “virtual manufacturing” companies that focus on developing goods and outsource their production to contract manufacturers.

13 See Jonathan Haskel and Stian Westlake, *Capitalism Without Capital: The Rise of the Intangible Economy*, Princeton, NJ: Princeton University Press, 2017.

14 Some trade in intangible assets is captured in trade statistics through intellectual property royalties, which are influenced by tax considerations. But the creation (rather than final ownership location) of intangible assets takes place in countries with talent, legal protections, and innovation ecosystems.

15 See Mary Hallward-Driemeier and Gaurav Nayyar, *Trouble in the making? The future of manufacturing-led development*, World Bank, 2017.

v. Value chains are becoming more regional and less global

Until recently, long-haul trade crisscrossing oceans was becoming more prevalent as transportation and communication costs fell and as global value chains expanded into China and other developing countries. The share of trade in goods between countries within the same region (as opposed to trade between more far-flung buyers and sellers) declined from 51 percent in 2000 to 45 percent in 2012.

That trend has begun to reverse in recent years. The intraregional share of global goods trade has increased by 2.7 percentage points since 2013, partially reflecting the rise of emerging-market consumption. This development is most noticeable for Asia and the EU-28 countries. Regionalization is most apparent in global innovations value chains, given their need to closely integrate many suppliers for just-in-time sequencing. This trend could accelerate in other value chains as well, as automation reduces the importance of labor costs and increases the importance of speed to market in company decisions about where to produce goods.

III. THE GEOGRAPHY OF GLOBAL DEMAND IS ONE OF THE FORCES RESHAPING VALUE CHAINS

The map of global demand, once heavily tilted toward advanced economies, is being redrawn—and value chains are reconfiguring as companies decide how to compete in the many major consumer markets that are now dotted worldwide. According to current projections, emerging markets will consume almost two-thirds of the world's manufactured goods by 2025, with products such as cars, building products, and machinery leading the way.¹⁶ By 2030, developing countries are projected to account for more than half of all global consumption

¹⁶ Matteo Mancini, Wiktor Namysl, Rafael Pardo, and Sree Ramaswamy, "Global growth, local roots: The shift toward emerging markets," August 2017, McKinsey.com.

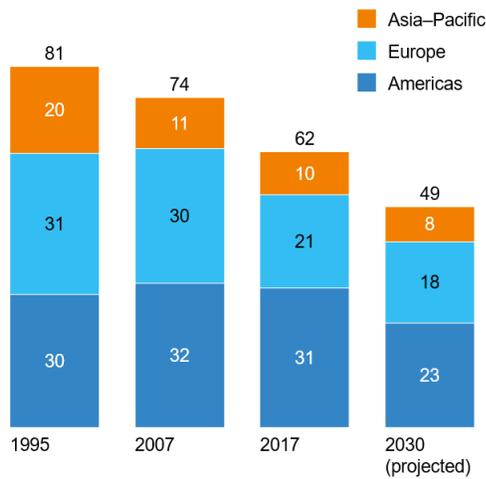
(Exhibit 4). These nations continue to deepen their participation in global flows of goods, services, finance, people, and data.

Exhibit 4

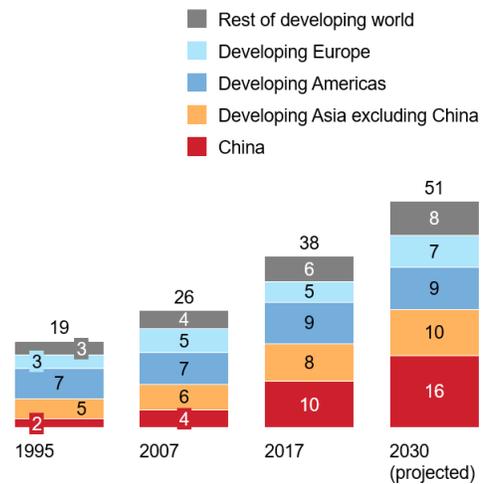
By 2030, developing countries, led by China and emerging Asia, could account for more than half of global consumption.

%

Advanced economies' share of global consumption by region



Developing economies' share of global consumption by region



NOTE: Figures may not sum to 100% because of rounding.

SOURCE: McKinsey Global Growth Model; McKinsey Global Institute analysis

McKinsey & Company 4

The biggest wave of growth has been happening in China, although there have been recent signs of slowing. Previous MGI research highlighted China’s working-age population as one of the key global consumer segments; by 2030, they are projected to account for 12 cents of every \$1 of worldwide urban consumption.¹⁷

¹⁷ *Urban world: The global consumers to watch*, McKinsey Global Institute, April 2016.

As it reaches the tipping point of having more millionaires than any other country in the world, China now represents roughly a third of the global market for luxury goods, with an estimated \$7.4 billion in annual spending. By 2025, McKinsey projects that it could account for 44 percent of the total global market for luxury goods.¹⁸ In 2016, 40 percent more cars were sold in China than in all of Europe, and China also accounts for 40 percent of global textiles and apparel consumption. China's smartphone market is also the largest in the world, with 444 million shipments in 2017.¹⁹

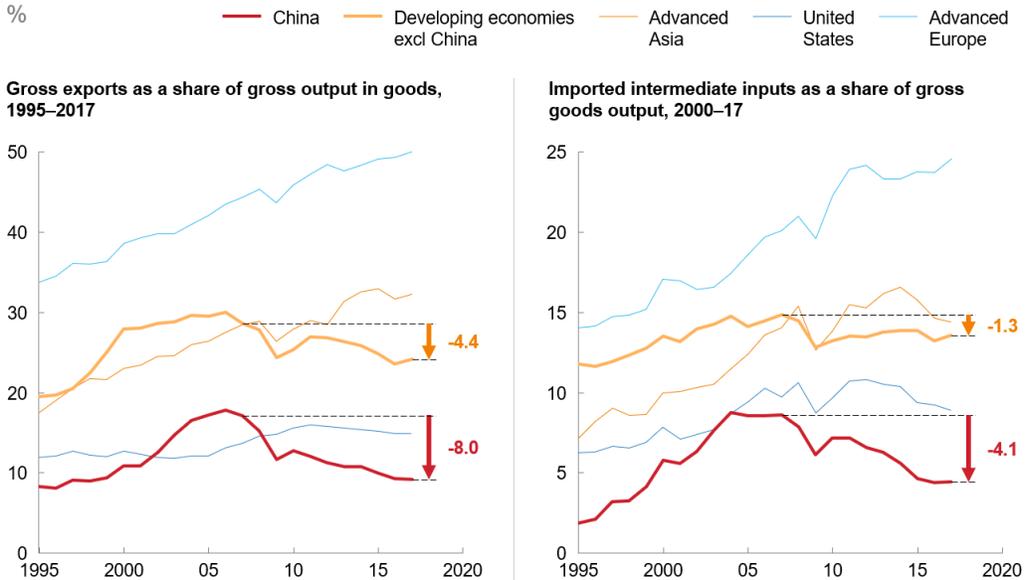
As consumption grows, more of what gets made in China is now sold in China (Exhibit 5). This trend is contributing to the decline in trade intensity. Within the industry value chains we studied, China exported 17 percent of what it produced in 2007. By 2017, the share of exports was down to 9 percent. This is on a par with the share in the United States but is far lower than the shares in Germany (34 percent), South Korea (28 percent), and Japan (14 percent). This shift has been largely obscured because the country's output, imports, and exports have all been rising so dramatically in absolute terms. But overall, China is gradually rebalancing toward more domestic consumption.

¹⁸ *Chinese luxury consumers: The 1 trillion renminbi opportunity*, McKinsey & Company 2017 China Luxury Report, May 2017.

¹⁹ Yu Nakamura and Aya Onishi, "China's smartphone war escalates as largest market matures," *Nikkei Asian Review*, March 1, 2018.

Exhibit 5

Since 2007, trade intensity has fallen in China and other developing economies.



SOURCE: World Input-Output Database; McKinsey Global Institute analysis

McKinsey & Company 5

The rising middle class in other developing countries is also flexing new spending power. By 2030, the developing world outside of China is projected to account for 35 percent of global consumption, with countries including India, Indonesia, Thailand, Malaysia, and the Philippines leading the way. In 2002, India, for example, exported 35 percent of its final output in apparel, but by 2017, that share had fallen by half, to 17 percent, as Indian consumers stepped up purchases.

Growing demand in developing countries also offers an opportunity for exporters in advanced countries. Only 3 percent of exports from advanced economies went to

China in 1995, but that share was up to 12 percent by 2017. The corresponding share going to other developing countries grew from 20 to 29 percent. In total, advanced economies' exports to developing countries grew from \$1 trillion in 1995 to \$4.2 trillion in 2017. In the automotive industry, Japan, Germany, and the United States send 42 percent of their car exports to China and the rest of the developing world. In knowledge-intensive services, 45 percent of all exports from advanced economies go to the developing world. The Asia–Pacific region is already a top strategic priority for many Western brands.

IV. THE INTENSITY OF GLOBAL TRADE HAS FALLEN DUE TO THE RISE OF DOMESTIC SUPPLY CHAINS IN CHINA AND OTHER EMERGING ECONOMIES

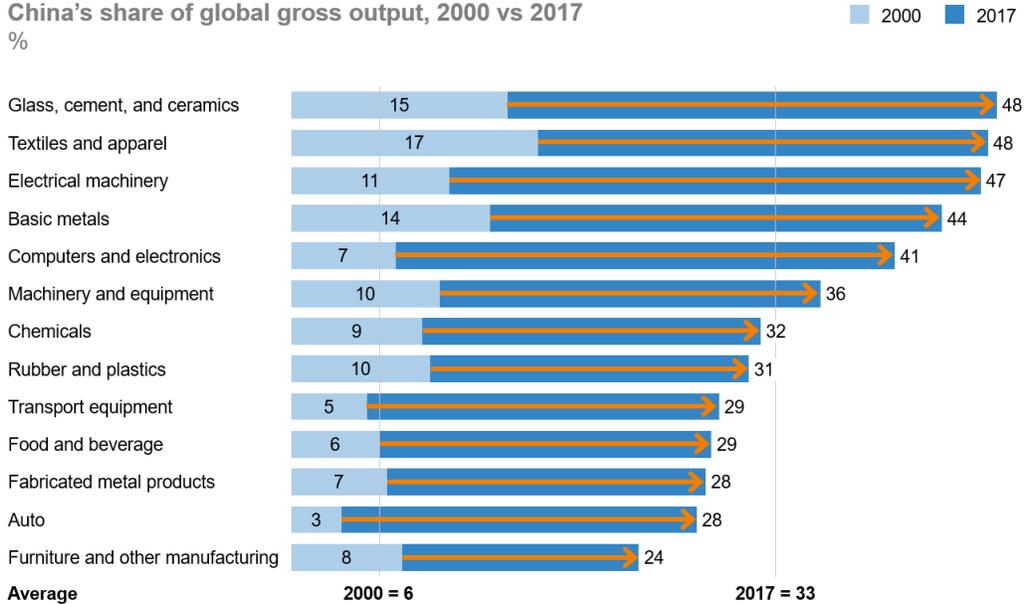
China's rapid growth has made it a major part of virtually every goods-producing global value chain (Exhibit 6). Overall, it now accounts for 20 percent of global gross output, up from just 4 percent in 1995. In textiles and apparel, electrical machinery, and glass, cement, and ceramics, it now produces nearly half of global output.

China's rise in global trade began with importing intermediate goods and re-exporting assembled products to the world. In the past decade, however, it has developed more comprehensive domestic supply chains and more vertically integrated industries, with homegrown companies stepping into many new market niches. As China builds new industrial capacity, it is modernizing industries at the same time, phasing out aging factories and building more technologically advanced new plants.

Exhibit 6

China's share of global output has increased dramatically in every global value chain since 2000.

China's share of global gross output, 2000 vs 2017
%



SOURCE: World Input-Output Database; McKinsey Global Institute analysis

McKinsey & Company 6

China now produces many intermediate goods and conducts more R&D in its own domestic supply chains. This new China effect explains the entirety of the recent slowdown in goods trade that has been observed at the global level. The steepest fall-off in China's intermediate trade has occurred in computers and electronics. Measured as a share of global output, trade in intermediate inputs fell by 5.1 percentage points between 2007 and 2017. China fully accounted for the fall; in fact, trade in intermediate inputs actually expanded slightly among other countries participating in this value chain. The industry's overall trade intensity (that is, exports of intermediate and final goods as a share of gross output) fell sharply over

the decade as China's industry became more vertically integrated and more of the computers, phones, and devices it turns out were sold to Chinese consumers rather than being shipped abroad.

Other developing countries are beginning to exhibit the same structural shifts seen in China, although they are at earlier stages. In textiles and apparel, for instance, production networks spanning multiple stages are consolidating within individual countries such as Vietnam, Bangladesh, Malaysia, India, and Indonesia.

As a group, emerging Asia has become less reliant on imported intermediate inputs for the production of goods than the rest of the developing world (8.3 percent versus 15.1 percent in 2017). By contrast, in developing Europe, where economic growth has been slower, companies have continued to integrate into the supply chains of companies in Western Europe.

The decline in trade intensity reflects growing industrial maturity in emerging economies. Over time, their production capabilities and consumption are gradually converging with those of advanced economies. Declining trade intensity in goods does not mean globalization is over; rather, digital technologies and data flows are becoming the connective tissue of the global economy.²⁰

V. NEW TECHNOLOGIES COULD FURTHER DAMPEN GOODS TRADE, BUT FUEL CROSS-BORDER FLOWS OF SERVICES

The explosive growth of cross-border data flows, highlighted in MGI's previous research on digital globalization, is ongoing. From 2005 to 2017, the amount of

²⁰ See Susan Lund and Laura Tyson, "Globalization is not in retreat: Digital technology and the future of trade," *Foreign Affairs*, May 2018.

cross-border bandwidth in use grew 148 times larger. A torrent of communications and content travels along these digital pathways—and some of this traffic reflects companies interacting with foreign operations, suppliers, and customers.

Instant and low-cost digital communication has had one clear effect: lowering transaction costs and enabling more trade flows. But the impact of next-generation technologies on global flows of goods and services will not be as simple (Exhibit 7). The net impact is uncertain, but in some plausible scenarios, the next wave of technology could dampen global goods trade while continuing to fuel service flows.

Exhibit 7

New technologies will have varying impacts on global flows (1 of 3).

NOT EXHAUSTIVE

	Technology ¹	Example	Impact on flows				
			Primary resources	Manu- factured goods	Ser- vices	Data	
Reducing trans- action costs	Digital platforms	E-commerce	US consumer buys shoes from UK e-commerce site	—	▲	▲	▲
	Logistics technologies	Automated document processing	Paperless customs documentation processing in India reduces time for loading/unloading ships	▲	▲	▲	▲
		Internet of Things	IoT sensors track shipments from Brazil to Angola	▲	▲	▲	▲
		Next-gen transportation	New material enables shipping through Arctic route	▲	▲	—	—
		Autonomous vehicles	Autonomous vehicles move cargo in ports, airports, and warehouses	▲	▲	—	▲
	Data processing technologies	Blockchain	Blockchain enables automated cross-border insurance claims ²	—	—	▲	▲
		Cloud	An Australian company utilizes Google Cloud	—	—	▲	▲

¹ We focus on a sample of currently available and deployed technologies that materially impact trade. This list is not exhaustive.
² Blockchain can also make logistics more efficient (eg, automating payments through blockchain-based smart contracts).

SOURCE: McKinsey Global Institute analysis

New technologies will have varying impacts on global flows (2 of 3).

NOT EXHAUSTIVE

		Technology ¹	Example	Impact on flows			
				Primary resources	Manu- factured goods	Ser- vices	Data
Altering economics of production	Additive manufacturing	3-D printing	3-D printing of toys at home	—	▼	▲	▲
			3-D printing of hearing aids in Vietnam for global distribution	—	▲	—	—
	Automation	Advanced robotics	A company equips a new UK factory with robots to make appliance manufacturing viable	—	▼	—	—
			Bangladesh automates textiles production, boosting productivity to gain global market share	—	▲	—	—
	Artificial intelligence	Virtual assistants	A British retailer deploys virtual assistants for customer service calls, substituting for offshore labor in a call center	—	—	▼	▼
		Robotic process automation (RPA)	A Philippine company employs RPA in back office processing, reducing cost and increasing volume	—	—	▲	▲

¹ We focus on a sample of currently available and deployed technologies that materially impact trade. This list is not exhaustive.

SOURCE: McKinsey Global Institute analysis

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New technologies will have varying impacts on global flows (3 of 3).

NOT EXHAUSTIVE

		Technology ¹	Example	Impact on flows			
				Primary resources	Manu- factured goods	Ser- vices	Data
Transformation of existing products and creation of new products	Digital goods	Streaming movies/music	Drake's new album is streamed a billion times globally in one week	—	▼	▲	▲
	New goods	Renewable energy	China increases electricity generation from renewables, reducing coal and LNG imports	▼	—	—	—
		Electric vehicles	European consumers buy more EVs, requiring fewer imported parts and lower oil imports	▼	▼	—	—
		Telemedicine	A German doctor relies on 5G to perform remote robotic surgery on a patient in Turkey	—	—	▲	▲

¹ We focus on a sample of currently available and deployed technologies that materially impact trade. This list is not exhaustive.

SOURCE: McKinsey Global Institute analysis

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i. Digital platforms, logistics technologies, and advances in data processing will continue to reduce cross-border transaction costs, enabling all types of flow

In goods-producing value chains, logistics costs can be substantial. Companies often lose time and money to customs processing or delays in international payments. Three sets of technologies will continue to reduce these frictions in the years ahead.

Digital platforms can bring together far-flung participants, making cross-border search and coordination more efficient and enabling smaller businesses to participate. E-commerce marketplaces have already enabled significant cross-border flows by aggregating huge selections and making pricing and comparisons more transparent. Alibaba's AliResearch projects that cross-border B2C e-commerce sales will reach approximately \$1 trillion by 2020. B2B e-commerce could be five or six times as large. While many of those transactions may substitute for traditional offline trade flows, e-commerce could still spur some \$1.3 trillion to \$2.1 trillion in incremental trade by 2030, boosting trade in manufactured goods by 6 to 10 percent. Continued rapid growth in small-parcel trade would present a challenge for customs processing, however.

Logistics technologies also continue to improve. The Internet of Things (IoT) can make delivery services more efficient by tracking shipments in real time, and AI can route trucks based on current road conditions. Automated document processing can speed goods through customs. At ports, autonomous vehicles can unload, stack, and reload containers faster and with fewer errors. Blockchain shipping solutions can reduce transit times and speed payments. We calculate that new logistics

technologies could reduce shipping and customs processing times by 16 to 28 percent. By removing some of the frictions that slow the movement of goods today, these technologies together could potentially boost overall trade by 6 to 11 percent by 2030.²¹

ii. Automation and additive manufacturing are changing production processes and the relative importance of various inputs

Previous MGI research has found that roughly half of the tasks that workers are paid to do could technically be automated, suggesting a profound shift in the importance of capital versus labor across industries.²² The growing adoption of automation and advanced robotics in manufacturing makes proximity to consumer markets, access to resources, workforce skills, and infrastructure quality assume more importance as companies decide where to produce goods. Companies are reconsidering location decisions as a result.

Service processes can also be automated by artificial intelligence (AI) and virtual agents. The addition of machine learning to these virtual assistants means they can perform a growing range of tasks. Companies in advanced economies are already automating some customer support services rather than offshoring them. This could reduce the \$160 billion global market for business process outsourcing (BPO), now one of the most heavily traded service sectors.

²¹ The academic literature finds that a 1 percent reduction in trade costs can result in a 0.4 percent increase in trade flows. See Simeon Djankov, Caroline Freund, and Cong S. Pham, “Trading on time,” *The Review of Economics and Statistics*, 2010, Volume 92, Number 1.

²² *Jobs lost, jobs gained: Workforce transitions in a time of automation*, McKinsey Global Institute, December 2017.

Additive manufacturing (3-D printing) could also influence future trade flows. Most experts believe it will not replace mass production over the next decade; its cost, speed, and quality are still limitations. But it is gaining traction for prototypes, replacement parts, toys, shoes, and medical devices. While 3-D printing could reduce trade in some specific products substantially, the drop is unlikely to amount to more than a few percentage points across overall trade in manufactured goods by 2030. In some cases, additive manufacturing could even spur trade by enabling customization.²³

Overall, we estimate that automation, AI, and additive manufacturing could reduce global goods trade by up to 10 percent by 2030, as compared to the baseline. However, this reflects only the direct impact of these technologies on enabling production closer to end consumers in advanced economies. It is also possible that these technologies could lead to nearshoring and regionalization of trade instead of reshoring in advanced economies. Moreover, developing countries could adopt these technologies to improve productivity and retain production, thereby sustaining trade.

iii. In the face of shifting value chains, companies need to reevaluate how they operate globally

Both the costs and the risks of global operations are shifting. Several imperatives stand out for global companies in this landscape:

²³ Caroline Freund et al., *Is 3D printing a threat to global trade? The trade effects you didn't hear about*, World Bank Group, forthcoming.

Reassess where to compete along the value chain. Business leaders need to continuously monitor where value is moving in their industry and adapt accordingly.²⁴ Some companies, like Apple and many pharmaceutical firms, have narrowed their focus to R&D and distribution while outsourcing production. By contrast, many makers of consumer goods take a hyperlocal approach, with customized product portfolios for individual markets. Providers of “global-local” services, such as Airbnb and Uber, have recognized global brands but also extensive local operations that deliver in-person services. Network companies, most of which are knowledge-intensive service providers, create value through a geographically dispersed operating model and global reach. Regardless of the strategy, a key point is to maintain control, trust, and collaboration in all parts of the value chain. For some companies, this might mean bringing more operations in-house. Those that outsource need to re-evaluate supplier relationships and management (see below).

Consider how to capture value from services. Across multiple value chains (including manufacturing), more value is coming from services, whether software, design, intellectual property, distribution, marketing, or after-sales services. Shifting to services can offer advantages: smoothing cyclicalities in sales, providing higher-margin revenue streams, and enabling new sales or design ideas due to closer interaction with customers. At its extreme, entire business models shift from producing goods to delivering services (for example, from selling vehicles to

²⁴ See Pankaj Ghemawat, *The New Global Road Map: Enduring Strategies for Turbulent Times*, Boston, MA: Harvard Business Review Press, 2018; and Everett Grant and Julieta Young, *The double-edged sword of global integration: Robustness, fragility and contagion in the international firm network*, Globalization and Monetary Policy Institute working paper number 313, 2017.

offering transportation services, or from selling packaged software and servers to selling cloud subscriptions). To excel in services, companies need to gain insight into customer needs, invest in data and analytics, and develop the right subscription, per-use, or performance-based service contracts.

Reconsider operational footprint to reflect new risks. One of the most important considerations is where to locate operations and invest in new capacity. The calculus that held in the past is different today. New automation technologies, changing factor costs, an expanding set of risks, and the need for speed and efficiency are all driving regionalization in many goods-producing value chains. As a result, it may make sense to place production in or near key consumer markets around the world. Before investing, companies should consider the full risk-adjusted, end-to-end landed costs of location decisions—and today many do not account for all of the variables. Using a dynamic, risk-adjusted scenario approach rather than a simple point forecast of demand or cost can inform better decisions about shaping an operational footprint.

Be flexible and resilient. Today companies face a more complex set of unknowns as the postwar world order that held for decades seems to be giving way. There is a real chance that tariffs and nontariff barriers will continue to rise, reversing decades of trade liberalization. Tax codes are being reconsidered to account for flows of data and intangibles. Building agile operations can help firms prepare for these types of uncertainties. This can take many forms, such as using versatile common platforms to share components across product lines and multiple plants. In purchasing, companies have achieved flexibility through price hedging,

long-term contracting, shaping customer demand to enable using substitutes, and building redundancies into supply chains.

Prioritize speed to market and proximity to customers. Companies in all industries now have a wealth of real-time, granular sales and consumer behavior data at their disposal, but it takes manufacturing and distribution excellence to capitalize on these insights. Speed to market enables faster responses to what customers want and less product waste from forecasting errors. This does not necessarily require large-scale reshoring or full vertical integration in every major market. Companies can opt for postponement—that is, creating a largely standardized product at a distance and then finishing it with custom touches at a facility near the end market.

Build closer supplier relationships. In the last era of globalization, the fragmentation of value chains and the trend toward offshoring led many companies into arm's-length relationships with suppliers across the globe. But that approach involved hidden risks and costs. It makes sense to identify which suppliers are core to the business, then solicit their ideas and deepen relationships with them. With a growing share of product value being provided by the supply chain, firms that genuinely collaborate can secure preferred customer status and benefit from new product ideas or process efficiencies bubbling up from suppliers. Large firms can also bring about systemic changes along the value chain, improving labor and environmental standards. Logistics and production technologies can transform supply chains, but optimizing what they can do requires end-to-end integration. Larger companies may need to help their small and medium-size suppliers upgrade and add digital capabilities to realize the full value.

VI. THE ROAD AHEAD IS DIVERGING FOR DIFFERENT SETS OF COUNTRIES AND WORKERS

To understand the larger implications of these shifts in global value chains, we group countries into nine categories (Exhibit 8). We first divide them into two groups: advanced and developing. From there, we further segment them based on the global value chain archetype in which they run the largest trade surplus. While countries participate in multiple global value chains (as seen in the diversification metric), these groupings nevertheless offer a useful way to assess their exposure to ongoing structural shifts.

Exhibit 8

Each country's specialization and diversification in trade determines its exposure to trends in value chains (1 of 2).

Classification	Country	GDP per capita, 2017 \$ thousand	MGI Connected-ness Index, 2017 ¹	Global value chain archetype with largest trade surplus, 2017 Sector within this archetype with the largest trade surplus	Trade intensity (Exports + imports) ÷ GDP %	Diversification of exports Number of sectors accounting for 75% of exports	
		<ul style="list-style-type: none"> High (>20) Middle (8–20) Low middle (2–8) Low (<2) 	<ul style="list-style-type: none"> Very high High Medium Low Very low 	<ul style="list-style-type: none"> Global innovation Labor-intensive goods Regional processing Resource-intensive goods Services (all) 			
Advanced	Innovation providers	Germany	High	Very high	Auto	83	10
		Ireland	High	Very high	Pharma	125	4
		Italy	High	High	Machinery and equipment	59	10
		Japan	High	High	Auto	33	7
		Netherlands	High	High	Chemicals	175	9
		Singapore	High	High	Computers	278	7
		South Korea	High	High	Computers and electronics	78	8
	Regional processors	Austria	High	High	Paper	96	11
		Finland	High	High	Paper	69	10
		Spain	High	High	Food and beverage	61	10
	Resource providers	Australia	High	High	Mining	40	5
		Canada	High	High	Oil and gas	61	10
		Norway	High	High	Oil and gas	64	7
		Saudi Arabia	High	High	Oil and gas	52	3
	Service providers	France	High	High	Financial intermediation	59	9
		Sweden	High	High	Telecom and IT	74	11
		United Kingdom	High	High	Financial intermediation	55	10
United States		High	High	IP charges	25	10	

¹ Index based on flows of goods, services, finance, people, and data. For methodology, see Digital globalization: The new era of global flows, McKinsey Global Institute, February 2016.
NOTE: We group countries based on the industries in which they run the largest trade surplus, but most countries participate in multiple value chains. This grouping should not be viewed as a ranking.

Each country's specialization and diversification in trade determines its exposure to trends in value chains (2 of 2).

Classification	Country	GDP per capita, 2017 \$ thousand	MGI Connected- ness Index, 2017 ¹	Global value chain archetype with largest trade surplus, 2017 Sector within this archetype with the largest trade surplus	Trade intensity (Exports + imports) ÷ GDP %	Diversification of exports Number of sectors accounting for 75% of exports	
		<ul style="list-style-type: none"> High (>20) Middle (8–20) Low middle (2–8) Low (<2) 	<ul style="list-style-type: none"> Very high High Medium Low Very low 	<ul style="list-style-type: none"> Global innovation Labor-intensive goods Regional processing Resource-intensive goods Services (all) 			
Developing	Innovation providers	Hungary	High	Very high	Auto	163	9
		Mexico	Middle	High	Auto	78	7
	Labor providers	China	Middle	Very high	Textiles and apparel	39	8
		India	Low middle	High	Furniture	33	9
		Turkey	Middle	High	Textiles and apparel	50	9
	Regional processors	Vietnam	Low middle	High	Textiles and apparel	202	5
		Argentina	Low middle	Medium	Food and beverage	24	6
		Indonesia	Low middle	Medium	Food and beverage	36	8
		Malaysia	Middle	High	Food and beverage	136	8
		Poland	Middle	High	Food and beverage	97	12
	Resource providers	Thailand	Low middle	High	Food and beverage	114	9
		Brazil	Middle	Medium	Agriculture	22	8
		Colombia	Low middle	Medium	Oil and gas	32	6
		Nigeria	Low middle	Medium	Oil and gas	30	1
	Service providers	Russia	Middle	High	Oil and gas	45	6
		South Africa	Low middle	Medium	Basic metals	61	8
		Costa Rica	Low middle	Medium	Business services	54	5
Kenya		Low middle	Medium	Transport services	30	5	
Morocco		Low middle	Medium	Telecom and IT	78	7	
Philippines		Low middle	Medium	Business services	62	7	

¹ Index based on flows of goods, services, finance, people, and data. For methodology, see Digital globalization: The new era of global flows, McKinsey Global Institute, February 2016.
NOTE: We group countries based on the industries in which they run the largest trade surplus, but most countries participate in multiple value chains. This grouping should not be viewed as a ranking.

No matter where countries specialize today, strengthening service sectors and capabilities is an important opportunity for the future. Investment in R&D will be critical to competing in an increasingly knowledge-intensive global economy. All countries—and particularly those that are major producers of labor-intensive goods—need to prepare for the wider adoption of automation technologies. There is a great deal of unrealized potential in deepening regional trade ties in many parts of the world. Finally, every country can benefit from streamlining customs operations and modernizing trade agreements for a global economy in which flows of services, intellectual property, and data are increasingly vital.

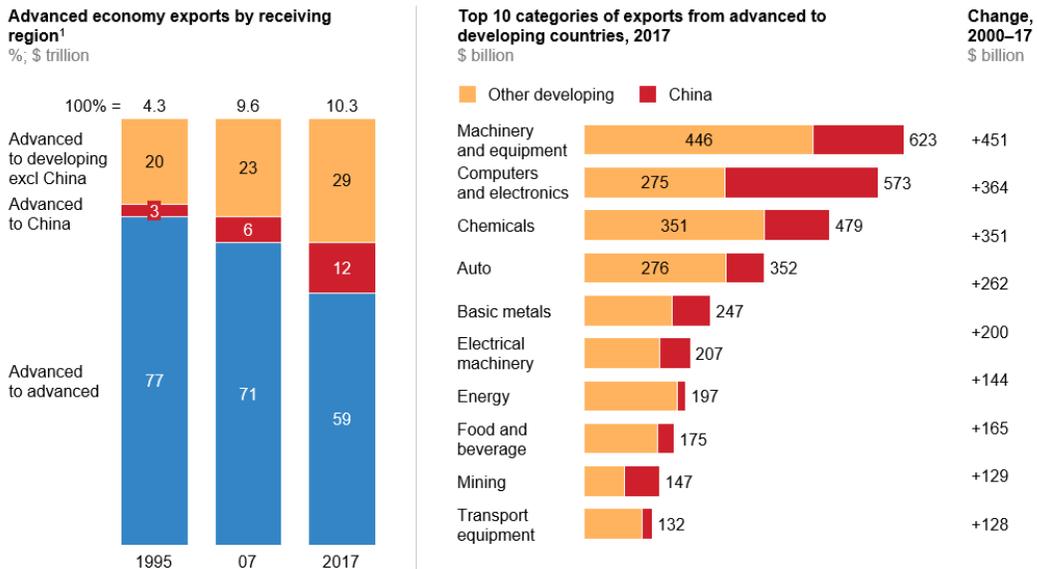
There is reason to believe many advanced economies may have already made it through the worst of the disruption stemming from the globalization of value chains. The structural shifts described in this research favor countries with skilled workforces, service capabilities, innovation ecosystems, and lucrative consumer markets—all of which line up with the comparative advantages of advanced economies. These countries will also benefit from the rise of consumers in developing countries if they can tap into export demand. The share of advanced-economy exports to developing economies increased from 23 percent in

1995 to more than 40 percent in 2017, with notable growth in machinery and equipment along with computers and electronics (Exhibit 9).

In some middle-income countries, manufacturing workers may face disruptions in the years ahead as some production shifts to lower-wage countries and as automation technologies substitute for some types of labor. Higher levels of productivity and skills will be important for middle-income countries to set themselves apart; this includes keeping pace with technology advances in both manufacturing and logistics. China, for example, is steadily climbing into the

Exhibit 9

China and the developing world are an increasingly important source of demand for advanced economies.



¹ Based on advanced economy reporting, goods and services.
NOTE: Figures may not sum to 100% because of rounding.
SOURCE: IMF; UNCTAD; OECD; WTO; McKinsey Global Institute analysis

higher-value global innovators group by embracing automation and AI. Developing

specialized capabilities can help middle-income countries carve out new roles in specific industry value chains and attract more foreign direct investment. But low-skill workers in those countries may struggle to find a place in the new economy.

Historically, labor-intensive manufacturing for export has been the only successful path for low- and middle-income countries to rapidly climb the economic ladder. Now the window of opportunity may be narrowing as automation technologies erode the advantage of large low-wage workforces.²⁵ But the window is not closed yet. Developing economies such as Bangladesh, India, and Vietnam are managing to achieve solid growth in labor-intensive manufacturing exports, while China continues to develop more knowledge-intensive sectors. Countries pursuing this path will need to invest in transportation and logistics infrastructure and modern, technology-enabled factories that can compete globally. Regional processing value chains may be a promising avenue for diversification.

One subset of developing countries has a critical advantage: geographic proximity to major advanced economy consumer markets. As automation changes the balance of capital and labor, many multinationals are considering investing in new production capabilities closer to end consumer markets to tighten coordination of their supply chains and reduce shipping times. Mexico plays this type of “nearshoring” role for the United States; Turkey and a number of Eastern European countries are linked into value chains based in Western Europe; and Thailand, Malaysia, and Indonesia play the same role for higher-income Asia-Pacific

²⁵ Dani Rodrick, *New technologies, global value chains, and the developing economies*, Pathways for Prosperity Commission Background Paper Series number 1, September 2018.

countries. This trend may also lead China to rely more on neighboring countries for production.

...

Globalization is in the midst of a transformation. Soaring demand and the development of more comprehensive supply chains in China and other emerging economies, and the increased penetration of next-generation technologies are fundamentally transforming the nature of global value chains. Yet the public debate tends to be dominated by trade—and about recapturing the past rather than looking toward the future.

The mix of countries, companies, and workers that stand to gain in the next era is changing. Companies may need to rethink strategy for how they operate globally. Policy makers will need to consider how to support citizens through the disruption that changing globalization brings. Understanding how the landscape is shifting will help business leaders and policy makers to prepare for the next chapter of globalization, and the opportunities and challenges it presents.

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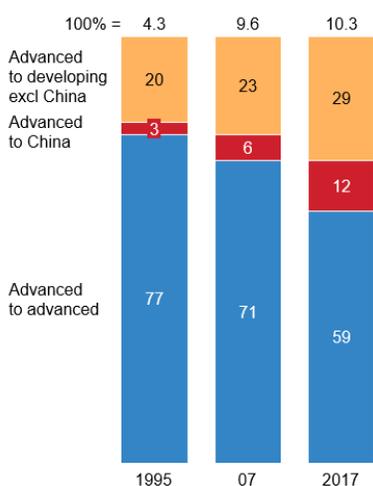
I would also like to express my appreciation to the following scholars and experts for their deep insights: Matthew J. Slaughter, the Paul Danos Dean of the Tuck School of Business and the Earl C. Daum 1924 Professor of International Business at Dartmouth; Michael Spence, Nobel laureate and William R. Berkley Professor in Economics and Business at the NYU Stern School of Business; and Laura Tyson, distinguished professor at the Haas School of Business, University of California, Berkeley; Richard Baldwin of the Graduate Institute, Geneva; Carol Corrado of the Conference Board; Jonathan Haskel of the Imperial College Business School; Michael Mandel of the Progressive Policy Institute; Sebastien Miroudot of the OECD; Hal Varian of Google; Stian Westlake of Nesta; and Wilkie Wou of Esquel; Michael Mann, Kristy Howell, James Fetzner, and Ryan Noonan of the Bureau of

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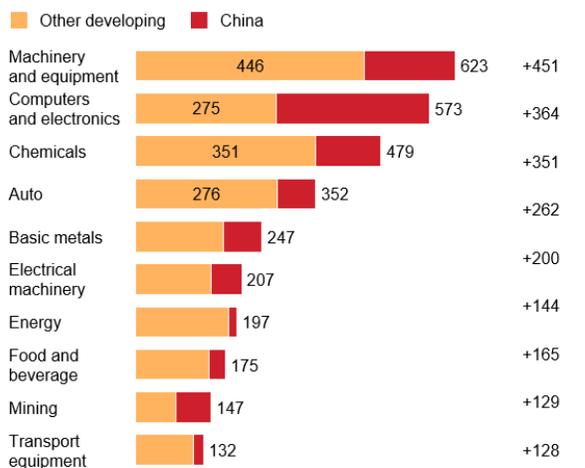
Exhibit 9

China and the developing world are an increasingly important source of demand for advanced economies.

Advanced economy exports by receiving region¹
%, \$ trillion



Top 10 categories of exports from advanced to developing countries, 2017
\$ billion



¹ Based on advanced economy reporting, goods and services.
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SOURCE: IMF, UNCTAD; OECD; WTO; McKinsey Global Institute analysis

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manufacturing and logistics. China, for example, is steadily climbing into the higher-value global innovators group by embracing automation and AI. Developing specialized capabilities can help middle-income countries carve out new roles in specific industry value chains and attract more foreign direct investment. But low-skill workers in those countries may struggle to find a place in the new economy.

Historically, labor-intensive manufacturing for export has been the only successful path for low- and middle-income countries to rapidly climb the economic ladder. Now the window of opportunity may be narrowing as automation technologies erode the advantage of large low-wage workforces.²⁶ But the window is not closed yet. Developing economies such as Bangladesh, India, and Vietnam are managing to achieve solid growth in labor-intensive manufacturing exports, while China continues to develop more knowledge-intensive sectors. Countries pursuing this path will need to invest in transportation and logistics infrastructure and modern, technology-enabled factories that can compete globally. Regional processing value chains may be a promising avenue for diversification.

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