

Discussion paper

# Global flows: The ties that bind in an interconnected world

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# Global flows: The ties that bind in an interconnected world

Ours is an interdependent world, connected by global flows of goods, services, capital, people, data, and ideas. Global value chains have been built on these flows, creating a more prosperous world. However, in light of the pandemic, Russia's invasion of Ukraine, and years of rising tensions between the United States and China, some have speculated that the world is already deglobalizing. New MGI analysis finds a reality that is more nuanced. The globe remains deeply interconnected, and flows have proved remarkably resilient during the most recent turbulence. Furthermore, no region is self-sufficient. The challenge therefore is to harness the benefits of interconnection even while managing the risks and downsides of dependency—particularly where products are concentrated in their places of origin.

## **While global trade has stabilized, flows linked to knowledge and know-how are driving global integration.**

Growth in global flows is now being driven by intangibles, services, and talent. They have picked up the baton from goods trade whose growth as a share of the global economy stabilized around 2008 after 30 years of rapid expansion. Flows of services, international students, and intellectual property grew about twice as fast as goods flows in 2010–19 while data flows grew at nearly 50 percent annually. Most flows have proved robust in the face of recent disruption. Goods flows hit a record high in 2021, despite the lingering impact of the pandemic. Capital flows grew by more than 50 percent a year in 2019–21.

**No region is close to being self-sufficient.** Every region imports more than 25 percent of at least one important type of resource or manufactured good that it needs, and often much more. Latin America, Sub-Saharan Africa, and Eastern Europe and Central Asia are net

importers of manufactured goods; they import more than 50 percent of the electronics they need. The European Union and Asia–Pacific import more than 50 percent and 25 percent, respectively, of their energy resources. North America has fewer areas of very high dependency but relies on imports of both resources, notably minerals, and manufactured goods.

## **Products whose origins are concentrated in just a few geographies exist in all sectors and most notably in electronics and mining.**

Concentration is a two-sided coin. Concentration often reflects specialization that enables efficiency gains. However, interruption of concentrated trade flows can be particularly disruptive when they are harder to replace at short notice. China exports more than 60 percent of the most concentrated products in the electronics and textiles sectors. Asia–Pacific contributes disproportionately to exports of concentrated minerals. Lithium, rare earths, and graphite are particularly concentrated, largely extracted from three or fewer countries and mostly refined in a single country: China. Latin America and North America account for the majority of the most concentrated agricultural products, notably soybeans. The majority of concentrated medical and pharmaceutical products come from Europe.

**Global value chains have evolved gradually in the past but may be shaped by new forces in the coming decade.** Global value chains have long been dynamic but with gradual shifts in composition. In the past, individual countries gained (or lost) no more than 2 percent of export share a year (annualized), and value chains cumulatively shifted by about 10 to 20 percent per decade. Between 1995 and 2008, the direction of change was almost uniformly toward less concentration and more interregional

trade as truly global value chains were unleashed by trade liberalization and technological progress. After around 2008, patterns of trade flows diverged. Global value chains accounting for around 40 percent of trade, including energy resources, electric equipment, and pharmaceuticals, reversed course, becoming more concentrated. The remaining value chains either stabilized or continued to become less concentrated and more interregional. This was the case for many services value chains, including professional services. Now new forces are emerging that could shape and accelerate the next evolution of some value chains. Policy makers are taking active steps to reconfigure value chains deemed to have strategic importance, while resilience, national economic priorities, and stakeholder pressures join technology, demand, and factor costs as key drivers of companies' decisions about their global footprint.

## **Multinational corporations play a pivotal role in managing global flows to deliver both growth and resilience in an interconnected world.**

Global flows are central to the functioning of economies and of businesses both big and small. Multinationals, which account for about two-thirds of global exports, play a pivotal role. They are confronting an increasingly contested global order in which operating in one market can create significant risks in others. They can consider (1) looking for growth opportunities by deepening participation in global flows that are growing in importance—services and intangibles stand out; (2) strengthening the resilience of their own organizations, for instance by diversifying, building stronger relationships with suppliers, and localizing operations; and (3) finding opportunities to use their central role to forge systemic resilience that benefits both their own and others' organizations.

# Global flows in an interconnected world

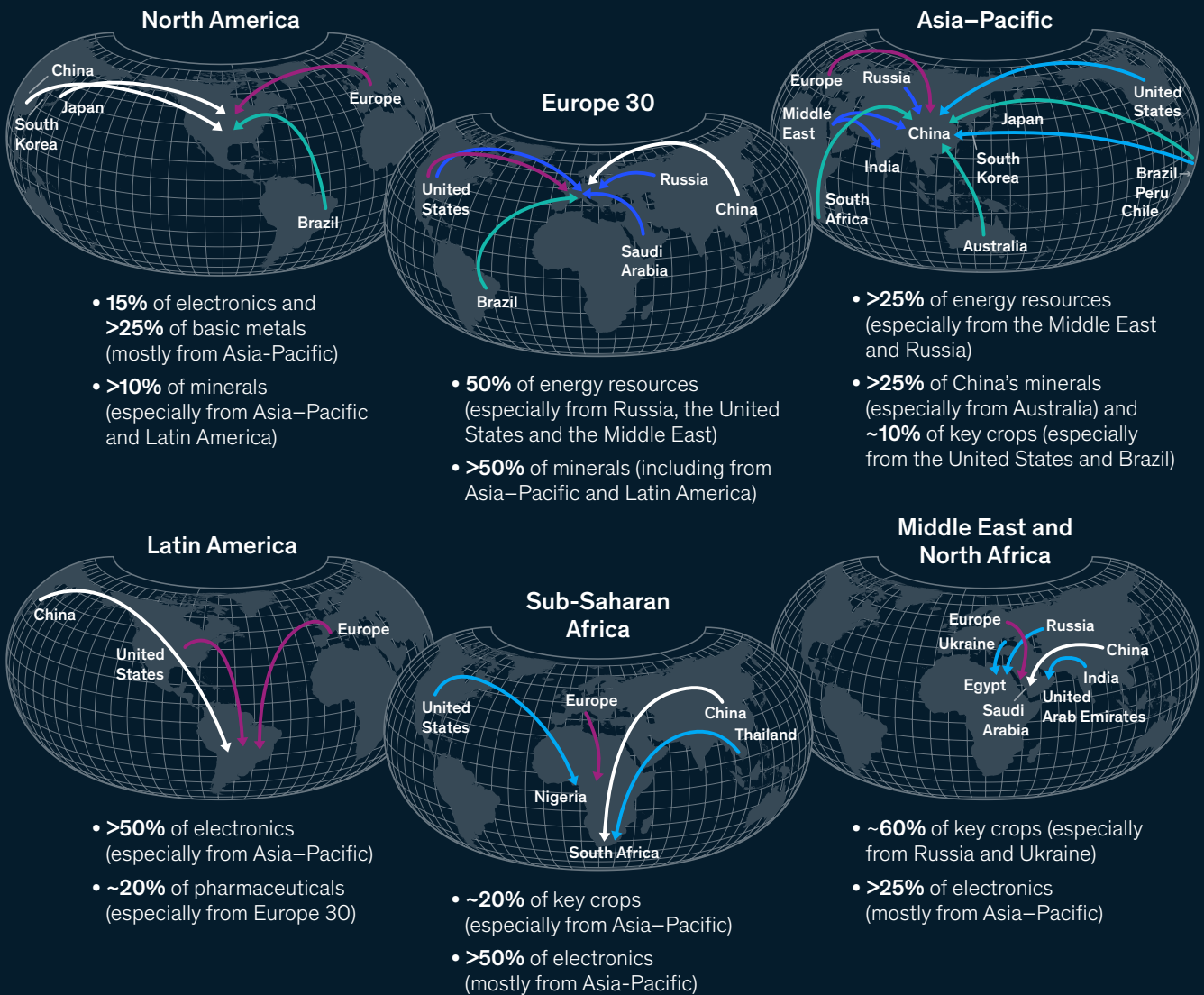
## Flows linked to knowledge and know-how are driving global integration



## No region is close to being self-sufficient

Largest interdependencies, by share of consumption met by net imports

Economy-to-economy flows: ▶ Agriculture ▶ Energy ▶ Minerals ▶ Electronics ▶ Pharmaceuticals



**As value chains are likely to continue to reconfigure ...**

- New policies to reshape incentives
- Diversification of supply chains to balance efficiency and resiliency
- New opportunities to unbundle and trade services

**... companies can play a pivotal role in managing global flows**

1. Find new opportunities through growing intangibles flows
2. Strengthen resilience in own organization
3. Forge systemic resilience through partnerships



Aerial view of a liquefied natural gas tanker moored to a jetty.  
© Felix Cesare/Getty Images

# Introduction

In light of the COVID-19 pandemic, Russia's invasion of Ukraine, and years of rising tensions between the United States and China, some have speculated about a deglobalized future. The pandemic interrupted the movement of people and placed extreme demands on supply chains. War in Ukraine has upset flows of many commodities. The cost of energy has risen more than it had since 1973 while food prices recorded the largest increase since early 2008.<sup>1</sup> The war has also cemented geopolitical risk at the top of the agendas of CEOs and policy makers. Interconnection creates risk of contagion, as recent events have demonstrated.

The world remains deeply interconnected. Goods, services, capital, people, data, and ideas move between countries across the globe. While growth in most of these flows slowed after the global financial crisis in 2008, all but capital have continued to increase. Flows of data, unleashed by the digital era, are exploding, creating new opportunities.

Yes, global interconnectivity means that disruption becomes global and risk spreads, but it has also conferred significant benefits. Previous MGI research found that in the long run, at least 10 percent of global GDP is dependent on flows, and some estimates put this figure as high as 40 percent. Flows of trade but also of capital, people, and data have enabled increased specialization and the unbundling of production, reducing the price and increasing the range of both goods and services.<sup>2</sup> Flows have fostered growth and supported poverty alleviation, but these gains have not been evenly distributed; many people are finding that their jobs have been displaced.<sup>3</sup>

The challenge is to harness the benefits of interconnection while managing the risks from interdependency.<sup>4</sup> Disruptions to flows can create disproportionate downstream impact on economies and on firms, ranging from the largest multinational corporations to the smallest micro businesses. Multinationals are pivotal players in global flows and therefore at the eye of the current storm. Many are now focusing on how to make their supply chains more resilient even as they work to find new opportunities. How they respond to this dual task will determine much about the future.

This paper offers a view of the flows driving global integration and an assessment of interdependency and concentration risks and the important role of multinational corporations. The research is based on a comprehensive assessment of trade (30 global value chains spanning resources, manufactured goods, and services), capital, people, and intangibles flows as well as an analysis of around 6,000 globally traded products.

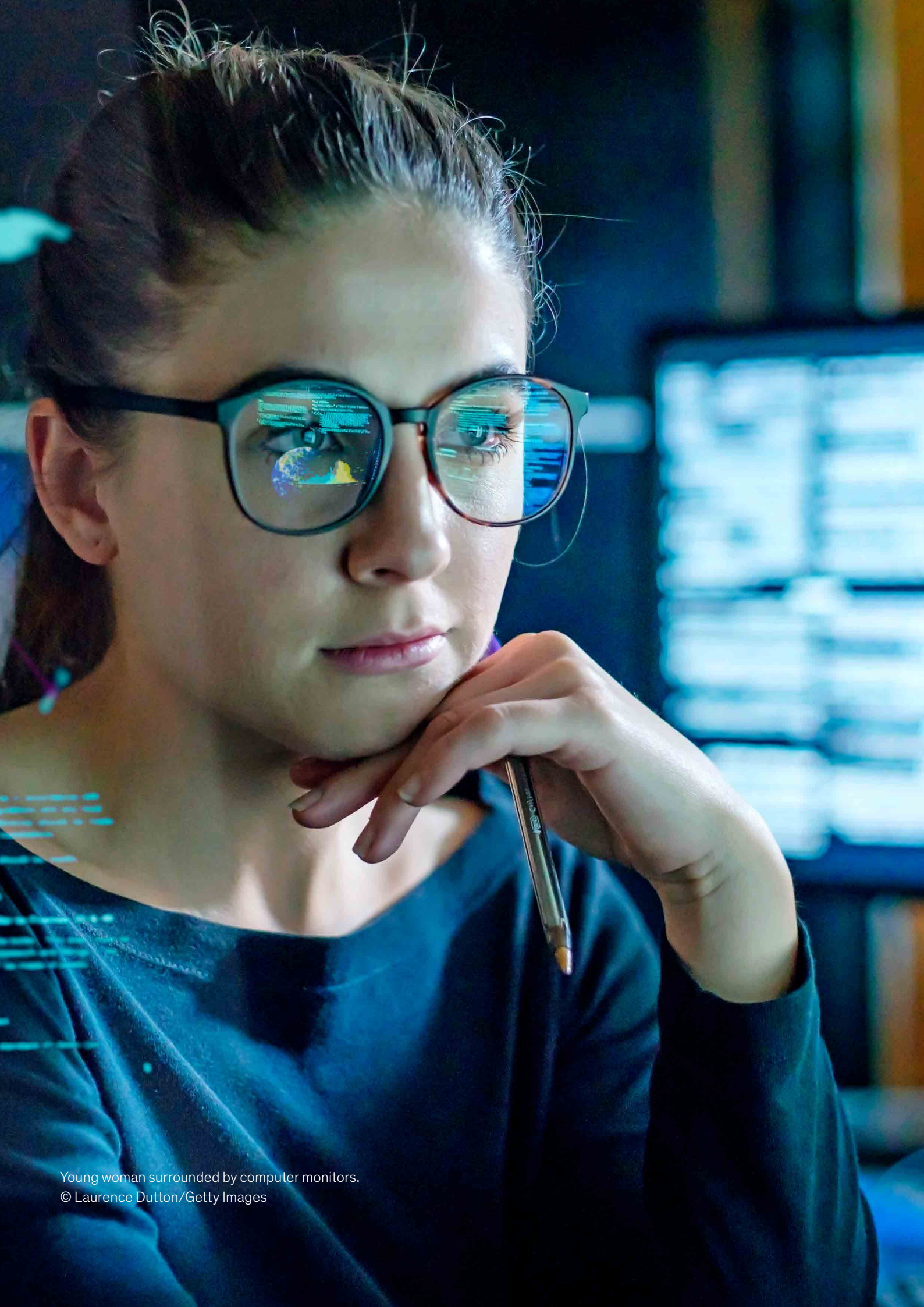
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<sup>1</sup> *Commodity markets outlook, April 2022: The impact of the war in Ukraine on commodity markets*, World Bank, April 2022.

<sup>2</sup> *Digital globalization: The new era of global flows*, McKinsey Global Institute, February 2016. The Organisation for Economic Co-operation and Development (OECD) found that a "localized regime" in which trade was 18 percent lower would result in the level of global GDP being 6 percent lower. See *Global value chains: Efficiency and risks in the context of COVID-19*, OECD Policy Responses to Coronavirus (COVID-19), OECD, February 2021. The Peterson Institute for International Economics estimated that 11 percent of US GDP was a direct result of increased trade since the 1960s. See Gary Clyde Hufbauer and Zhiyao (Lucy) Lu, *The payoff to America from globalization: A fresh look with a focus on costs to workers*, policy brief number 17-16, Peterson Institute for International Economics, May 2017. Also see Arnaud Costinot and Andrés Rodríguez-Clare, "Trade theory with numbers: Quantifying the consequences of globalization," in *Handbook of International Economics*, volume 4, Gita Gopinath, Elhanan Helpman, and Kenneth Rogoff, eds., Elsevier, 2014; and Richard Baldwin, *Globalization's three unbundlings*, Harvard University Press, 2016.

<sup>3</sup> See, for instance, David H. Autor, David Dorn, and Gordon H. Hanson, "The China syndrome: Local labor market effects of import competition in the United States," *American Economic Review*, October 2013; and David Autor, David Dorn, and Gordon H. Hanson, *On the persistence of the China shock*, working paper number 29401, National Bureau of Economic Research, October 2021.

<sup>4</sup> Bob Sternfels, Tracy Francis, Anu Madgavkar, and Sven Smit, "Our future lives and livelihoods: Sustainable and inclusive and growing," *McKinsey Quarterly*, October 2021.



Young woman surrounded by computer monitors.  
© Laurence Dutton/Getty Images



# 1. Flows most linked to knowledge and know-how are driving global integration

Flows of trade, people, capital, and data bind the world together, as MGI has documented since the early 2010s. That research discussed a shift in the relative importance of these flows, highlighting the increased importance of flows of data and intangibles.<sup>1</sup> Over the past decade, newer flows linked to knowledge and know-how have decisively come to the fore. The fastest-growing flows are now data, services, intellectual property (IP), and international students. They have picked up the baton from manufactured goods, resources, and capital—the primary drivers of global interconnectedness over the 20 years before the global financial crisis. Between 2010 and 2019, cross-border data flows increased at a staggering 45 percent annual rate, growing from about 45 to 1,500 terabits per second.<sup>2</sup> Over the same period, flows of services, IP, and international students grew at a more modest pace, but still at around 5 to 6 percent a year, about double the pace of growth of goods trade (Exhibit 1). The number of highly qualified migrants has risen markedly faster than overall migration.<sup>3</sup>

Trade flows have tended to become more knowledge-intensive. Between 2010 and 2019, services became the fastest-growing class and resources the slowest, reversing the order of relative growth rates seen between 1995 and 2008.<sup>4</sup> Within services, flows of knowledge-intensive services, including professional services, government services, IT services, and telecommunications, are growing the fastest. In manufactured goods, most value chains have become more intangibles-intensive.<sup>5</sup>

**The fastest-growing flows are now data, services, intellectual property, and international students.**

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<sup>1</sup> See *Global flows in a digital age: How trade, finance, people, and data connect the world economy*, McKinsey Global Institute, April 2014; *Digital globalization: The new era of global flows*, McKinsey Global Institute, March 2016; and *Globalization in transition: The future of trade and value chains*, McKinsey Global Institute, January 2019.

<sup>2</sup> In 2021, almost 3,000 terabits per second was attained.

<sup>3</sup> Based on European economies; Eurostat data.

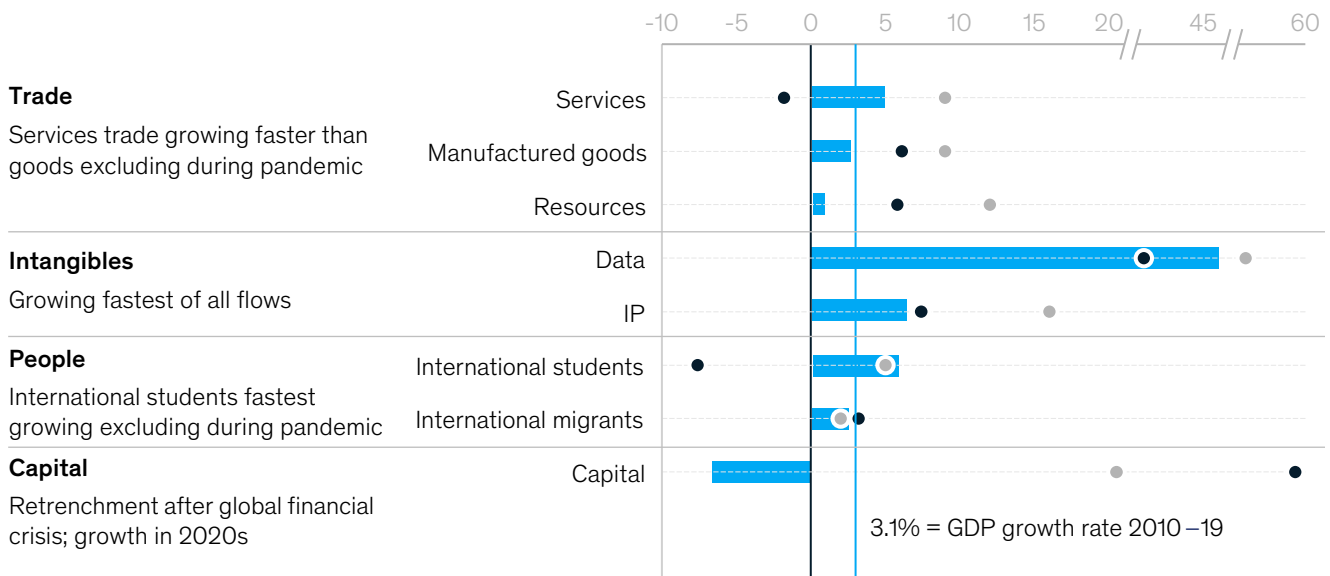
<sup>4</sup> Decreases in commodity prices account for some of the drop in resources flows. However, even correcting for this and comparing real growth rates, the same pattern holds true.

<sup>5</sup> *Globalization in transition: The future of trade and value chains*, McKinsey Global Institute, January 2019; and *Returns to intangible capital in global value chains: New evidence on trends and policy determinants*, OECD Trade Policy Paper, September 30, 2020.

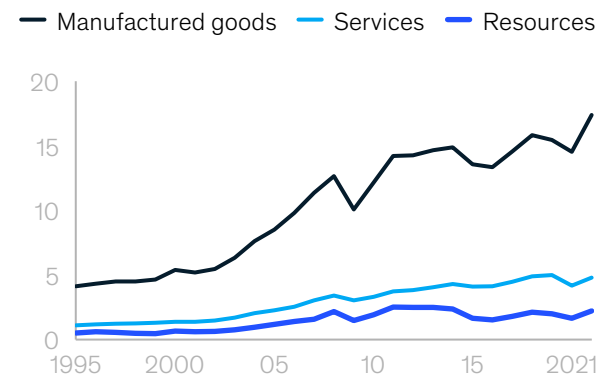
# Flows of intangibles, services, and students are now driving global integration.

Growth of flows, CAGR, %<sup>1</sup>

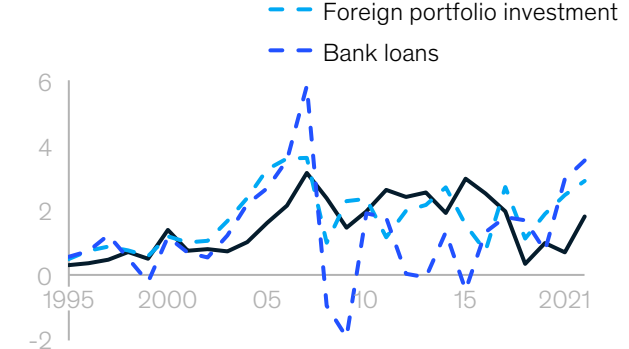
● Precrisis (1995–2008) ■ Postcrisis (2010–19) ● 2020s (2019–21)



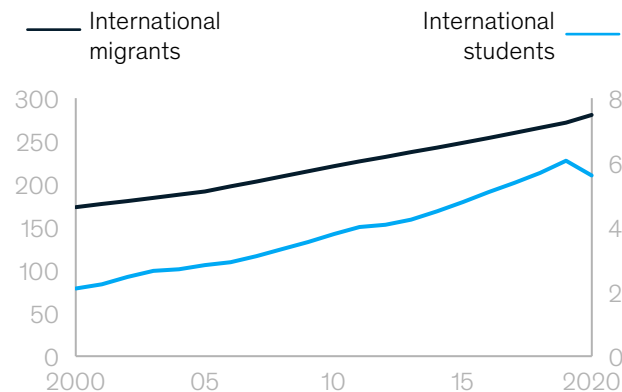
Trade, exports, \$ trillion



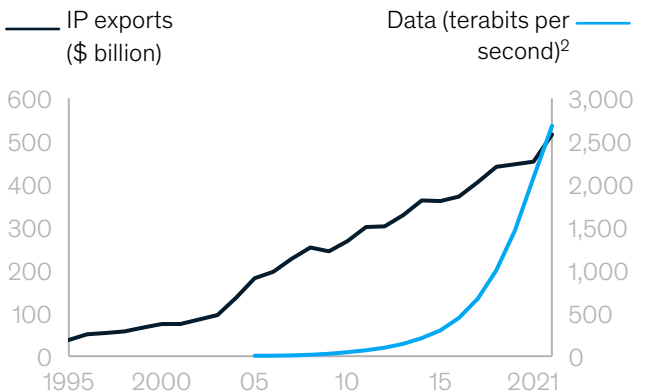
Capital, \$ trillion



People, million



Intangibles



<sup>1</sup>Slight adjustment for people flows for data availability: 1995–2010 for precrisis period, 2019–20 for postpandemic period. All growth rates are nominal.

<sup>2</sup>International used bandwidth.

Source: World Trade Organization; International Monetary Fund Balance of Payments; UN; Organisation for Economic Co-operation and Development (OECD); TeleGeography; World Bank; McKinsey Global Institute analysis

## Global flows have proved resilient—and contributed to resilience—in turbulent times

Despite the disruption wrought by the COVID-19 pandemic, most global flows continued to grow or even accelerated in 2020 and 2021. In the second quarter of 2020, when the pandemic was in its intense early phases, trade volumes initially fell by more than they had since World War II, spurred by a combination of a sharp decrease in consumer demand and delays in the production and processing of goods at major ports.<sup>6</sup>

Yet overall flows of intangibles, trade, and capital all increased, and their relative resilience was essential in navigating the turmoil of the pandemic. Flows of data crucially enabled remote working and the continued operation of businesses at a time when travel was largely impossible.

Trade in manufactured goods enabled regions to retain consumption while navigating disruptions in local production bases. For example, Asian supply chains were able to bridge the drop in output of Western supply chains in 2020.<sup>7</sup> Trade in manufactured goods reached a record high in 2021 despite new disruptions to supply chains at a time when growing consumer spending placed more demands on them. Demand for goods hit all-time highs as consumers—some of them buoyed by higher boosts to disposable income from fiscal stimulus measures—shifted spending toward goods and away from services during lockdowns and social distancing.<sup>8</sup> In 2022, trade in goods is projected to continue growing faster than GDP despite new disruptions.<sup>9</sup>

Even flows of services (other than travel and transportation services) experienced limited impact during the 2020s, dropping by less than 1 percent in 2020 and growing by about 15 percent in 2021. By the final quarter of 2021, total services trade was back at prepandemic levels.<sup>10</sup>

Capital flows accelerated, growing by more than 50 percent annually in 2019–21 as banks reallocated liquidity around the world and more multinationals relied on financing—some from foreign countries—to navigate the COVID-19 shock.<sup>11</sup>

The only flows that dropped substantially were those linked to the international movement of people. Travel and transportation services dropped by 40 percent in 2020 due to logistical disruptions and mobility restrictions as well as people choosing to curtail their movement. The number of international students also shrank, falling nearly 8 percent. The impact of the pandemic on flows of international migrants in 2021 is not yet known, but in 2020 numbers continued to grow, reaching record highs, although less quickly than they might have otherwise.<sup>12</sup>

**15%**  
growth in services  
(except travel and  
transportation) in 2021

## Trade in manufactured goods reached a record high in 2021 despite new disruptions to supply chains.

<sup>6</sup> C. Arriola, P. Kowalski, and F. van Tongeren, *The impact of COVID-19 on directions and structure of international trade*, OECD Trade Policy Papers, number 252, 2021; and *International shipping costs during and after COVID-19*, Federal Reserve Bank of St. Louis, May 2022.

<sup>7</sup> C. Arriola, P. Kowalski, and F. van Tongeren, *The impact of COVID-19 on directions and structure of international trade*, OECD Trade Policy Papers, number 252, 2021.

<sup>8</sup> *International trade during the COVID-19 pandemic: Big shifts and uncertainty*, OECD, March 2022; and Kristen Tauber and Willem Van Zandweghe, *Why has durable goods spending been so strong during the COVID-19 pandemic?* Economic Commentary number 2021-16, Federal Reserve Bank of Cleveland, July 2021.

<sup>9</sup> *Trade growth to slow sharply in 2023 as global economy faces strong headwinds*, World Trade Organization, October 2022.

<sup>10</sup> *Global trade update*, UNCTAD, February 2022.

<sup>11</sup> *World investment report 2022*, UNCTAD, 2022; and Bryan Hardy and Előd Takáts, "International banking amidst Covid-19: Resilience and drivers," *BIS Quarterly Review*, December 2020.

<sup>12</sup> *The world migration report 2022*, International Organization for Migration, December 2021.

## Knowledge-heavy flows are the most concentrated; most flows are primarily interregional

Some flows are highly distributed among many participating economies, while others tend to be largely concentrated in a few hubs that act as either origins or destinations. Flows of intangibles and capital tend to be the most concentrated, largely in advanced economies, while flows of people and trade tend to be comparatively more distributed. Some flows are regional, mostly connecting economies that are near each other. Most are global, crossing regional boundaries (Exhibit 2).

Within trade flows, characteristics can vary tremendously. Most trade occurs as part of global value chains, as resources, components, and services cross country borders on the way to becoming final products that are then shipped across the world. Concentration is most pronounced in knowledge-intensive and intangibles-heavy global value chains such as pharmaceuticals and electronics, known as global innovation value chains.<sup>13</sup> Six of the seven most concentrated value chains today all belong to this group. In global innovation value chains, intangibles create highly scalable assets that can be deployed globally at low marginal cost. This leads to large economies of scale and a self-reinforcing cycle of higher returns, creating an industry structure that is more concentrated in a few firms—a “superstar” effect where only a few firms or locations drive a disproportionate amount of economic activity.<sup>14</sup>

Flows tend to be more interregional when transportation costs are low in comparison with the value of the good traded or in cases where endowments are highly asymmetric, as in resources. Conversely, flows are generally more regional where transportation costs are higher, or where consumers in different regions have very different preferences, as is the case in automotive and in food and beverages.<sup>15</sup>

# 6/7

most concentrated value chains are “global innovation” value chains

## Flows of intangibles and capital tend to be the most concentrated, largely in advanced economies.

<sup>13</sup> Global innovation value chains are characterized by high trade intensity, high degree of value added, highly qualified workforces, and large spending on intangibles. For more on global value chains, see *Globalization in transition: The future of trade and value chains*, McKinsey Global Institute, January 2019.

<sup>14</sup> *Superstars: The dynamics of firms, sectors, and cities leading the global economy*, McKinsey Global Institute, October 24, 2018.

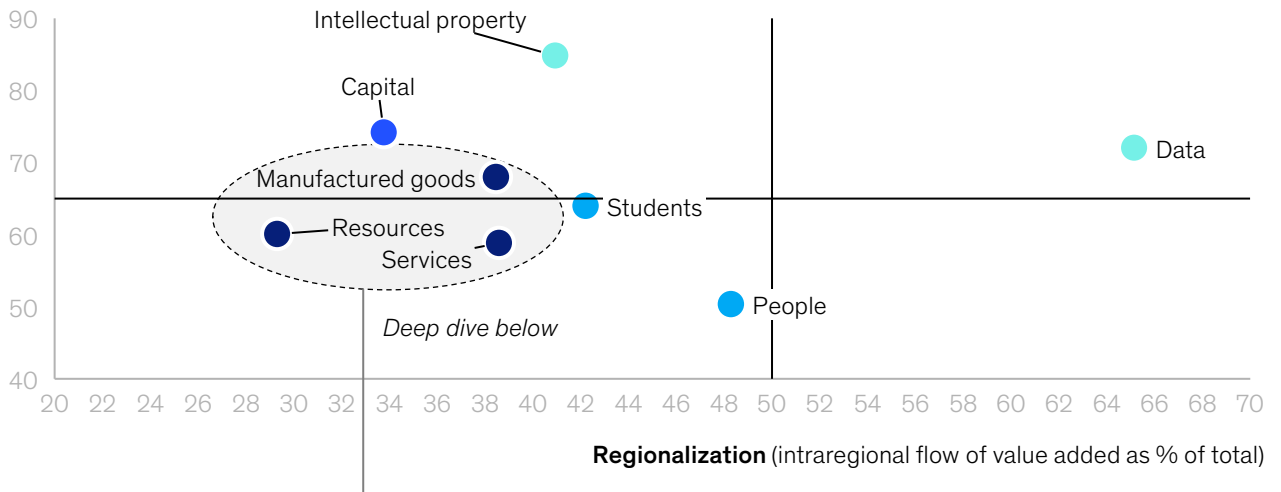
<sup>15</sup> A higher share of intraregional flows also appears in sectors with products where Armington elasticities are lower. See *Demand side: The Armington assumption*, World Bank, 2010.

**Knowledge-heavy flows are the most concentrated; most flows are primarily interregional.**

**Global flows, 2019**

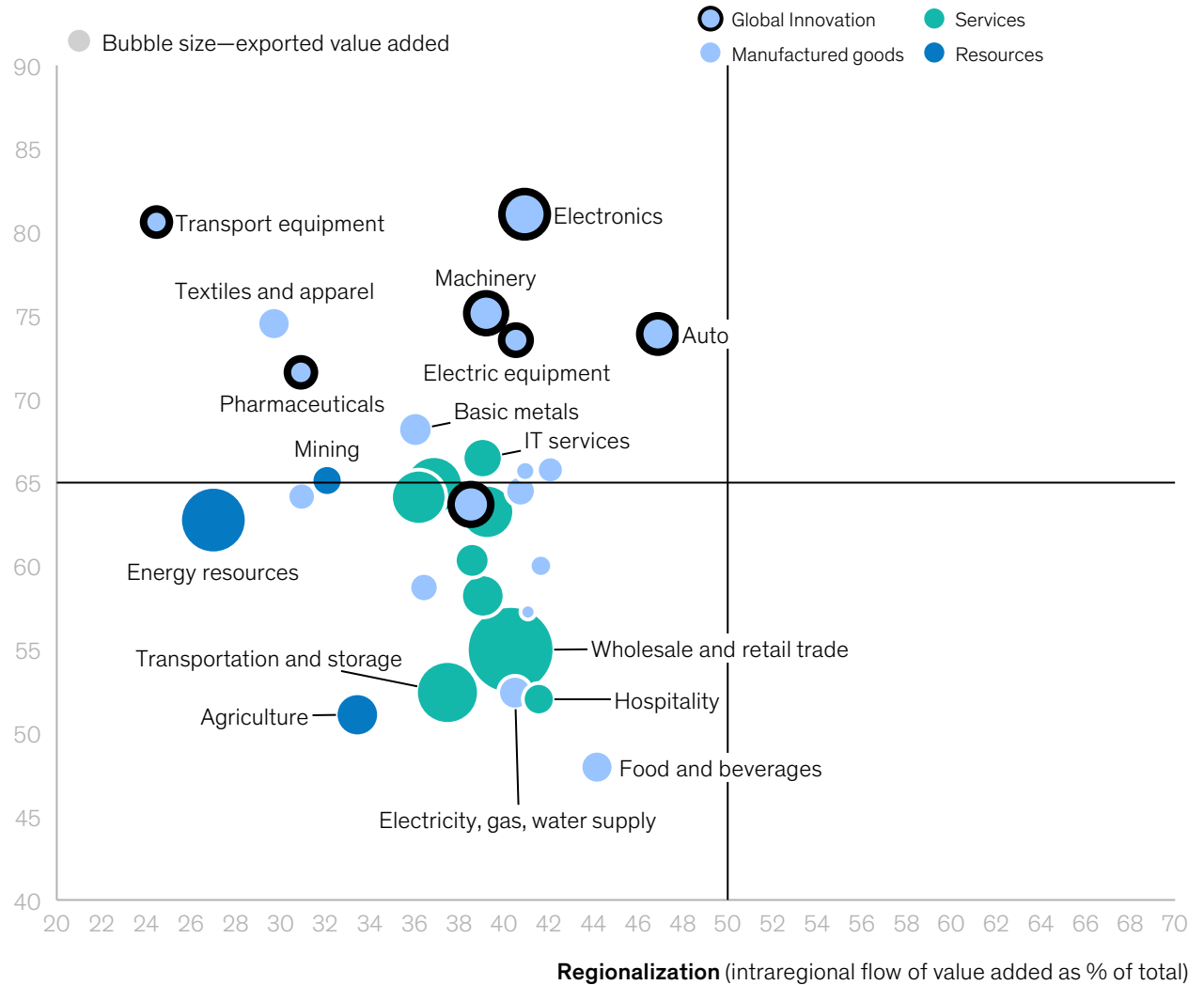
● Trade ● People ● Intangible ● Capital

**Concentration** (top 10 countries' share of exported value added as % of total)



**Global value chains in value-added terms, 2019**

**Concentration** (top 10 countries' share of exported value added as % of total)



Source: Trade in value added, OECD; BaTIS, OECD and World Trade Organization; International Monetary Fund; TeleGeography; McKinsey Global Institute analysis



Aerial view of a harvester in a wheat field in Ukraine.  
© KucherAV/Getty Images

## 2. No region is close to being self-sufficient

50%

of Europe 30's energy resource needs is imported

Geopolitical turbulence and recent extreme supply chain disruptions have prompted discussion about the potential for new supply chain architectures. However, no region is self-sufficient, and all regions are mutually interdependent, joined by large corridors of flows that crisscross the world (Exhibit 3).<sup>16</sup> More than half of global flows of goods and services (in value-added terms) cross regional boundaries, and every region has been importing 25 percent or more (in value-added terms) of its consumption needs of at least one important type of resource or manufactured good—and often much more.<sup>17</sup> Regional interdependencies can be even greater for specific inputs than they appear at the aggregate level. Today's global economy relies on the following particularly critical corridors joining regions:

- Asia–Pacific, including China, is the leading global manufacturing exporter overall and the largest supplier of electronics, but it imports more than 25 percent of its energy resource needs as well as critical intermediate goods. Energy resources from the Middle East and Russia power China and India. China also imports more than 25 percent of its mineral needs; the largest minerals corridors in the world run from Australia, Brazil, Chile, and South Africa to provide the inputs for China's manufacturing hub. Europe and North America provide much of the advanced machinery and the intangible know-how that supports production of advanced electronics such as semiconductors.
- Europe 30 is also a strong manufacturing region but imports more than 50 percent of its energy resource needs. Prior to 2022, Europe 30's largest source of energy resource imports was Russia. Since Russia's invasion of Ukraine in early 2022, European economies have been attempting to diversify sources of natural gas away from Russia.<sup>18</sup> Europe also depends on others for specific inputs to its manufacturing. For instance, while Europe 30 is a significant net exporter of pharmaceuticals, it relies on Asia–Pacific for crucial inputs of active pharmaceutical ingredients.

<sup>16</sup> This research looks at a number of regions: Europe 30 comprises the 27 European Union member states plus Norway, Switzerland, and the United Kingdom. Asia–Pacific comprises continental Asia, Australia, New Zealand, and Pacific island nations. North America comprises Canada, Mexico, and the United States. Latin America includes countries in the Caribbean. Eastern Europe and Central Asia includes Commonwealth of Independent States countries, Russia, Türkiye, and other European countries not included in Europe 30.

<sup>17</sup> Data flows are the only flows with an intraregional majority, at about 65 percent. However, this partly reflects the way data flows are measured and mostly reflects intra-European data flows. For other regions, less than 50 percent of these flows are intraregional. We use the bandwidth connecting each pair of countries as a proxy for data flows. Geographically proximate countries tend to have larger interconnections. Furthermore, data may need to cross multiple regional boundaries to reach their ultimate destination. A data flow between France and Japan, for example, may need to cross the border between France and Germany before moving east, leading to double counting of intraregional data flows.

<sup>18</sup> *REPowerEU: Joint European action for more affordable, secure and sustainable energy*, European Commission, March 2022.

- Resource-rich regions, namely Eastern Europe and Central Asia, Latin America, the Middle East and North Africa (MENA), and Sub-Saharan Africa, tend to be net importers of manufactured goods and services. These regions import manufactured goods roughly equally from Asia–Pacific and Europe.<sup>30</sup> Asia–Pacific is the largest partner of these regions for flows of electronics, textiles, and basic metals, while Europe<sup>30</sup> is the largest partner for pharmaceuticals and machinery. Resource-rich regions are often also net importers of some types of resources. For example, MENA is the largest net exporter of energy resources, but it depends on other regions for more than 60 percent of the key crops it needs for food. Prior to the invasion of Ukraine by Russia, large corridors flowed into the region from these two countries. In Latin America, Brazil and Argentina are two of the world's largest grain exporters, but they rely on flows of fertilizers from the rest of the world. Notably, they have been sourcing more than 50 percent of potash imports from Russia and Belarus.
- North America is a net importer of both manufactured goods and mineral resources; Asia–Pacific is its main partner for both. North America imports about 15 percent of its consumption needs of electronics, and Asia–Pacific accounts for about 85 percent of these imports, roughly split between China and other economies in the region. North America also imports about 10 percent of its mineral consumption, again with Asia–Pacific as its largest partner. North America's reliance on imports of minerals is even more pronounced when looking at a granular level. For example, the United States imports more than 70 percent of its consumption needs for more than 30 mineral commodities.<sup>19</sup>

Regional interconnections rely on hundreds of millions of people around the world ultimately working to meet the needs of consumers on the other side of the globe. For example, about 60 million workers from other regions ultimately serve North American demand, and roughly 50 million serve European demand.<sup>20</sup>

Regional interdependence is not new. Nevertheless, gradual shifts have occurred over the past decade. In general, manufacturing-dependent regions have increased their relative reliance on imports while resource-dependent regions have relatively decreased it. Notably, in 2019 the United States became a net exporter of energy resources—the largest reduction in dependency on resource inflows of any major economy.<sup>21</sup>

MENA reduced its interdependency on other regions for manufacturing by developing capacity in some industries, including basic metals, and food and beverages. In contrast, China increased its interdependency on resources to around 10 percent of its needs, as its fast-growing economy relied on resources—notably energy—that were not sufficiently available domestically.

**MENA is the largest net exporter of energy resources, but depends on other regions for more than 60 percent of the key crops it needs for food.**

<sup>19</sup> *Mineral commodity summaries 2022*, US Geological Survey, 2022.

<sup>20</sup> Based on OECD estimates of trade in employment. Figures include estimates of workers in every country serving final demand located in North America or Europe, excluding workers serving intraregional demand (for example, workers in Germany serving demand in France). Includes both manufacturing and services (but not primary resources).

<sup>21</sup> *The United States has been an annual net total energy exporter since 2019*, U.S. energy facts explained, US Energy Information Administration, retrieved October 2022.



## No region is self-sufficient.

Share of domestic consumption met by inflows, 2019, %



Note: IP flows can be distorted by different tax regimes. If outliers with very large IP flows relative to their size are excluded, Latin America is a net importer of IP.

<sup>1</sup>Limited sample for Middle East and North Africa (8 countries) and Sub-Saharan Africa (5 countries) in manufactured goods and services.

<sup>2</sup>IP calculated as net inflows as a share of total flows.

Source: International Energy Agency; USDA; UN Comtrade; Trade in value added, OECD; McKinsey Global Institute analysis



Aerial view of lithium extraction in the United States.  
©E+/Getty Images

# 3. Products that originate in only a few places are in every region and sector

Concentration is a two-sided coin. Specialization can foster efficiency while also leading to concentration. However, interruption of concentrated trade flows can be particularly disruptive, if products are harder to replace on short notice due to lack of visibility and alternatives.<sup>22</sup>

To date, no empirical analysis of the balance between the advantages of concentration and its potential downsides has been undertaken. On the latter, however, there are many instances of significant impact when concentrated products that are critical inputs to downstream applications are disrupted. For example, soaring global food prices in 2022 largely reflected disruption to agriculture value chains, including wheat and fertilizer (potash), the supply of which is highly concentrated in Russia and Ukraine.<sup>23</sup> Another highly concentrated product is semiconductors. Here disruptions in 2021 combined with increased demand caused significant downstream impact in many industries, notably automotive.<sup>24</sup> Semiconductor trade accounts for less than 10 percent of total trade, but products that directly or indirectly depend on semiconductor chips have been estimated to account for 65 percent of all goods exports.<sup>25</sup>

>75%

of global iron ore exports come from Australia and Brazil

MGI analysis of about 6,000 globally traded products (including resources and manufactured goods) suggests that products whose origins are concentrated in only a relatively few geographies are found in every sector and region and at every stage of the production process. This research defines concentrated products as those in the top quintile of concentration where up to three countries account for almost all supply.<sup>26</sup>

Some products are supplied by only a few places around the world. These account for a small but important share of global trade—less than 10 percent of global traded value—and originate in all regions and sectors.

A closer look reveals particularly prominent pockets of specialization in specific goods (Exhibit 4). China exports around 60 percent of the total value of concentrated products in each of the textiles and electronics sectors, including laptops, the most traded product by export value of all concentrated products. Asia–Pacific and Latin America account for the

<sup>22</sup> International Monetary Fund simulations suggest that the impact of shocks arising from disruptions to a large economy is double what it would be under a more diversified scenario. Assumes a 25 percent labor supply contraction in a single large global supplier. Gross domestic product for the average economy falls by 0.8 percent under the baseline scenario. In the high-diversification scenario, this decline is reduced by almost half. See *World Economic Outlook: War sets back the global recovery*, International Monetary Fund, April 2022.

<sup>23</sup> Elliott Smith, "Fertilizer prices are at record highs: Here's what that means for the global economy," CNBC, March 22, 2022.

<sup>24</sup> Ondrej Burkacky, Johannes Deichmann, Philipp Pflingst, and Julia Werra, "Semiconductor shortage: How the automotive industry can succeed," McKinsey & Company, June 2022.

<sup>25</sup> *Asian economic integration report 2022*, Asian Development Bank, February 2022.

<sup>26</sup> This research defines concentrated products as those in the top quintile of export concentration as measured by the 2019 Herfindahl-Hirschman index (HHI), a common measure of market concentration. The top quintile of global export concentration is an HHI of 3,170. This is roughly equivalent to three countries accounting for one-third of exports of a given product.

majority of the concentrated minerals that power our material world. Australia and Brazil account for more than 75 percent of iron ore exports, the most traded mineral by value. Australia and Chile contribute more than 75 percent of lithium supply. Many different critical concentrated minerals are extracted from other parts of the world. The Americas account for the largest share of concentrated agricultural products, many of which are essential to feed the global population. The United States and Brazil export more than 80 percent of soybeans. Europe 30 accounts for the majority of global supply of concentrated medical and pharmaceutical products, crucial for promoting global health and wellness. European nations, such as Belgium, Germany, and Ireland, export the majority of many critical pharmaceuticals; examples include vaccines and malaria drugs.

Beyond these global concentration hotspots, some countries and companies have concentrated dependency on only a few sources even in the case of products that are widely available around the world. Take wheat as an example. Its production is fairly globally distributed, with the top three suppliers accounting for less than 45 percent of supply. However, at the country level, flows are much more concentrated. For example, Türkiye and Egypt imported more than 75 percent of their wheat from Ukraine and Russia prior to 2022. In manufacturing, wiring sets used in the automotive industry are another example. Spain and South Korea import more than 75 percent of their wiring sets from Morocco and China, respectively. The largest global supplier is Mexico, but it accounts for only 20 percent of global supply.

In total, about one-third of global trade flows through such country-level hotspots, and the value of those flows is three times higher than of those in global concentration hotspots.<sup>27</sup> Country-level hotspots can arise through a mix of geography and privileged trade relationships.

To manage potential risks from concentration—arising at the global, country, or company level—economies and companies may pursue resilience measures. For some products, diversification of sources of origins may be possible, although it may involve substantial up-front investment, time, and, in some cases, higher operating costs. Europe’s drive to diversify away from natural gas imports from Russia is just one example. In other cases, innovation may provide an opportunity to avoid concentrated inputs through the redesign of products.

For many concentrated products, however, current availability will constrain supply in the short to medium term, suggesting that pronounced interdependencies are likely to continue to be a feature of the global economy in the foreseeable future. For example, diversification of minerals supply could take decades as this involves not only exploration but also development of processing capabilities in new geographies (see Box 1, “Diversifying the footprint of modern minerals value chains requires major investment over time”).

>75%

of wheat imported by Türkiye and Egypt from Ukraine and Russia prior to 2022

**Pronounced interdependencies are likely to continue to be a feature of the global economy in the foreseeable future.**

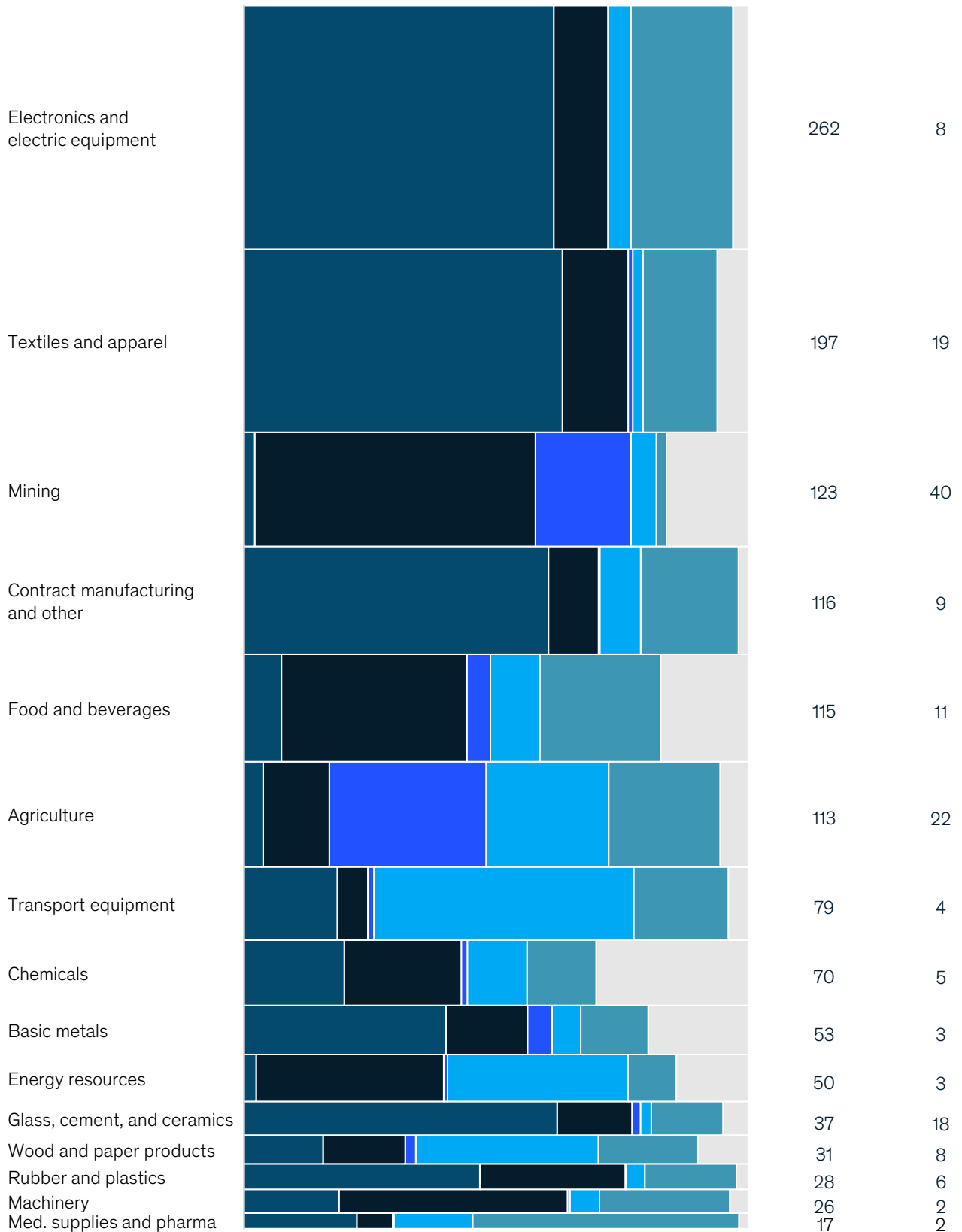
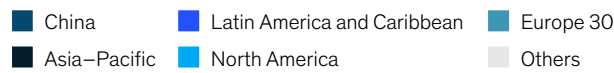
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<sup>27</sup> Applying the same cutoff of concentration, an HHI greater than 3,170, roughly equivalent to three countries supplying equal shares of a given product.

**Products that originate in only a few places are in every region and sector.**

**Share of total exported value of products in top quintile of concentration by region,<sup>1</sup> 2019**

**Total concentrated share of total traded value, \$ billion**      **Concentrated share of total traded value, %**



<sup>1</sup>A product is considered concentrated if its 2019 Herfindahl-Hirschman index (HHI) is in the top quintile (ie, greater than 3,170).  
Source: UN Comtrade; McKinsey Global Institute analysis

## Diversifying the footprint of modern minerals value chains requires major investment over time

Minerals are crucial inputs in almost every sector of the global economy. Some critical minerals, copper and nickel among them, are well known. Others are less commonly discussed but equally important to modern life. One example is neodymium, which is used in permanent magnets central to hard disk drives and electric motors.<sup>1</sup>

While the geological prevalence of many minerals is globally distributed, the concentration of many critical minerals is high not only in production but also in refining and processing.

For some minerals, efforts to diversify are under way. In the case of lithium, a pipeline of projects that have already been announced will introduce new players and geographies to the lithium-mining map, including North America, Sub-Saharan Africa, and Western and Eastern Europe.<sup>2</sup> For other minerals, substitution through innovation may be a possibility. In the case of cobalt, some electric vehicle battery makers are attempting to shift to different technologies that rely less on cobalt or avoid its use altogether.<sup>3</sup>

However, for many minerals, diversification of sources may not be feasible in the short to medium term without significant and sustained investment. Many minerals have highly specific use cases that require specific variants or purity levels, sometimes down to the individual mine of origin.<sup>4</sup> The time it takes to expand the supply of minerals in new geographies can be as high as 40 years, depending on the level of exploration to date.

The International Energy Agency, for example, found that it has taken more than 16 years, on average, just to move mining projects from discovery to first production.<sup>5</sup> Furthermore, use cases for many minerals require not only extraction but also processing capabilities, which, in turn, require technologies and human capital that may take many years to develop along with associated infrastructure.<sup>6</sup> The environmental and social toll associated with some of these developments is yet another hurdle to many potential projects.<sup>7</sup>

Take graphite as an example. This mineral is critical for many applications. One of its main uses is as a component of batteries in nearly all electric vehicles. Today, China accounts for more than 80 percent of extraction and global refining capacity for natural graphite. Newly developing an end-to-end graphite value chain is likely to take decades and presents multiple challenges. Developing new mines and processing facilities will require long lead times and technologies that no single region controls fully. Consider, for instance, that most of the world's commercial capacity to process flake graphite into battery-grade anode material currently operates in China, but that China relies on economies such as Japan and South Korea for some of the critical processing steps.<sup>8</sup> Moreover, additional infrastructure is required for processing, including large-scale hydrofluoric acid production. Finally, graphite extraction and processing has a significant

environmental impact, which has led to restrictions on production in some countries.<sup>9</sup> Recent efforts designed to tackle dependency on graphite have focused on both expanding supply in new regions and managing demand, specifically seeking alternative technologies that are less reliant on natural graphite.<sup>10</sup> Although research is under way, current alternatives imply cost or performance trade-offs.<sup>11</sup>

<sup>1</sup> "The raw-materials challenge: How the metals and mining sector will be at the core of enabling the energy transition," McKinsey & Company, January 2022.

<sup>2</sup> Marcelo Azevedo, Magdalena Baczyńska, Ken Hoffman, and Aleksandra Krauze, "Lithium mining: How new production technologies could fuel the global EV revolution," McKinsey & Company, April 2022.

<sup>3</sup> Marcelo Azevedo, Nicolò Campagnol, Toralf Hagenbruch, Ken Hoffman, Ajay Lala, and Oliver Ramsbottom, *Lithium and cobalt: A tale of two commodities*, McKinsey & Company, June 2018.

<sup>4</sup> Vince Beiser, "The ultra-pure, super-secret sand that makes your phone possible," *Wired*, August 7, 2018.

<sup>5</sup> *The role of critical minerals in clean energy transitions*, International Energy Agency, AL Energy Agency, May 2021.

<sup>6</sup> *Building resilient supply chains, revitalizing American manufacturing, and fostering broad-based growth*, The White House, June 2021; and *Lithium and cobalt: A tale of two commodities*, McKinsey & Company, June 2018.

<sup>7</sup> *Building resilient supply chains, revitalizing American manufacturing, and fostering broad-based growth*, The White House, June 2021.

<sup>8</sup> Karl Tsuji, *Global value chains: Graphite in lithium-ion batteries for electric vehicles*, Office of Industries working paper ID-090, US International Trade Commission, May 2022; and *Mineral commodity summaries 2022*, US Geological Survey, 2022.

<sup>9</sup> Peter Whoriskey, "In your phone, in their air," *Washington Post*, October 2, 2016; *Roskill: Graphite market continuously shaped by pollution controls*, Roskill, June 2019.

<sup>10</sup> "Australia's Syrah to expand U.S. graphite plant at \$220 mln grant," *Reuters*, October 20, 2022.

<sup>11</sup> *Building resilient supply chains, revitalizing American manufacturing, and fostering broad-based growth*, The White House, June 2021.





Engineer holds microchip in semiconductor factory  
©Sinology/Getty Images



# 4. New forces may reshape global value chains in the coming years

In light of the current turbulence in supply chains, economies, and geopolitics, CEOs are wondering how the future will unfold. It is useful to look at how global value chains have evolved in recent years for clues to what lies ahead.

Global value chains have long been dynamic, becoming more or less intensely traded, regionalized, and concentrated as powerful economic forces reshaped the global production system. An overarching theme of their evolution in recent years has been the spread of market economics and greater global interconnection, supported, for instance, by the formation of the World Trade Organization in 1995.

## 90%

of global value chains (by value added) became more intense, more interregional, and less concentrated in 1995–2008

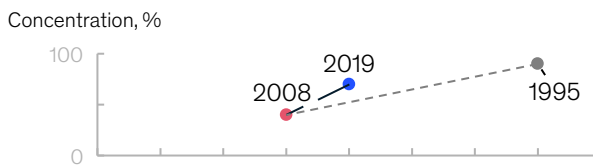
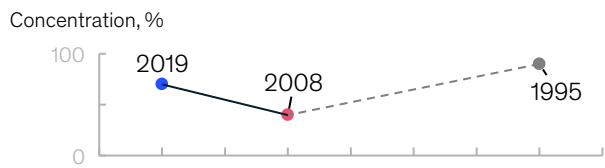
Between 1995 and 2008, the world grew more closely integrated as trade liberalization and technological advances unleashed a “great unbundling.” Physical production of many goods migrated to lower-cost emerging economies while developed ones continued to provide much of the technology and manufacturing know-how.<sup>28</sup> During this period, trade flows representing 90 percent of value added became more intense, more interregional, and less concentrated. Both trade intensity and the degree to which flows are interregional increased for every one of 30 individual global value chains. Concentration decreased in 26 value chains of the 30 (Exhibit 5).

**Between 1995 and 2008, the world grew more closely integrated as trade liberalization and technological advances unleashed a “great unbundling.”**

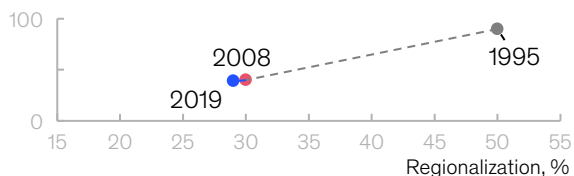
<sup>28</sup> Richard Baldwin, *Globotics and macroeconomics: Globalisation and the automation of the service sector*, National Bureau of Economic Research working paper number 30317, August 2022.

## After largely becoming less concentrated and regionalized from 1995 to 2008, global value chains followed four paths from 2008 to 2019.

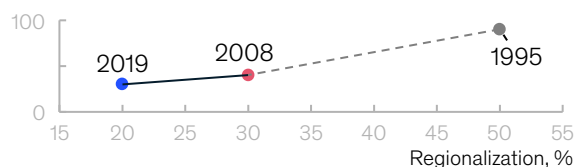
- 1 Increased concentration and decreased regionalization    2 Increased concentration and regionalization



- 3 Stabilization



- 4 Decreased concentration and regionalization



○ 1995    ○ 2008    ● 2019

Trend 2008–19	Global value chain	Concentration Top 10 countries' share of exported value added, %	Regionalization Intraregional share of exported value added, %	Trade intensity Exported share of total value added, %
		0 50 60 70 80 90	0 25 30 35 40 45 50 55	0 20 40 60 80
1 Increased concentration and decreased regionalization (30%)	Transport equipment	85	35	55
	Textiles and apparel	65	30	50
	Electric equipment	75	45	55
	Pharmaceuticals	70	35	50
	IT services	65	40	50
	Rubber and plastics	65	40	50
	Glass, cement, and ceramics	65	45	50
	Financial intermediation	65	40	50
	Mining of energy	65	30	55
	Construction and real estate	65	40	50
2 Increased concentration and regionalization (10%)	Electronics	75	40	55
	Basic metals	65	35	50
	Mining of minerals	65	30	55
	Petroleum products	65	30	50
	Chemicals	65	40	55
3 Stabilization (30%)	Machinery	75	40	55
	Automotive	75	45	55
	Telecommunications	65	35	50
	Wholesale and retail trade	65	35	50
	Electricity, gas, water supply	65	40	50
	Agriculture	65	35	50
	Food and beverages	65	45	50
4 Decreased concentration and regionalization (30%)	Professional services	65	40	55
	Fabricated metals	65	40	55
	Government services	65	40	55
	Paper and printing	65	40	55
	Other manufacturing	65	40	55
	Transportation and storage	65	40	55
	Hospitality	65	40	55

Source: McKinsey Global Institute analysis

The period around the global financial crisis marked an initial divergence in patterns of global interconnection. In general, forces propelling trade lessened as declines in tariffs and transportation costs and the impetus from labor arbitrage leveled off. Meanwhile, consumption in emerging markets exploded, and a larger share of their local production shifted to meeting local demand.<sup>29</sup> Total final demand in China and India roughly tripled and doubled, respectively, between 2008 and 2019. Overall, trade intensity leveled off, but patterns of value chain concentration and regionalization split into four different paths, described below:

**10–20%**

of total value created by value chains on average shifted geographies each decade

1. Flows accounting for 30 percent of total trade became more concentrated but less intraregional. They include some intangibles-heavy manufactured goods in places where superstar effects have reinforced existing hubs (including pharmaceuticals and electric equipment), resources where endowments dictate higher concentration (energy resources), and the two most traded knowledge-intensive services—finance and IT.
2. Flows accounting for 10 percent of total trade became more concentrated and more intraregional. They include value chains related to the extraction and processing of resources, including mining, basic metals, and petroleum products, as well as electronics manufacturing. In all cases, increased consumption and production integration within Asia drove regionalization.
3. Flows accounting for 30 percent of total trade were stable in their concentration and regionalization. They largely represent manufacturing goods, such as automotive and food and beverages, whose specialization gains didn't materially change after 2008.
4. Flows accounting for 30 percent of total trade, primarily services, became less concentrated and less regional. As more economies transition toward being more service-based and as technology increasingly facilitates services trade, more countries are participating in services flows.

Over roughly the past three decades, these shifts in value chains have occurred gradually. On an annualized basis, no individual country gained (or lost) more than two percentage points of export share. Over the course of a decade, on average about 10 to 20 percent of total value created by a value chain shifted geographies (Exhibit 6).<sup>30</sup> China has accounted for a large share of these shifts, most notably in manufacturing goods global value chains. It has gained the most share in 15 of 18 such value chains. In 11 of those, China's gain accounted for more than half the entire global movement in share from 1995 to 2019.

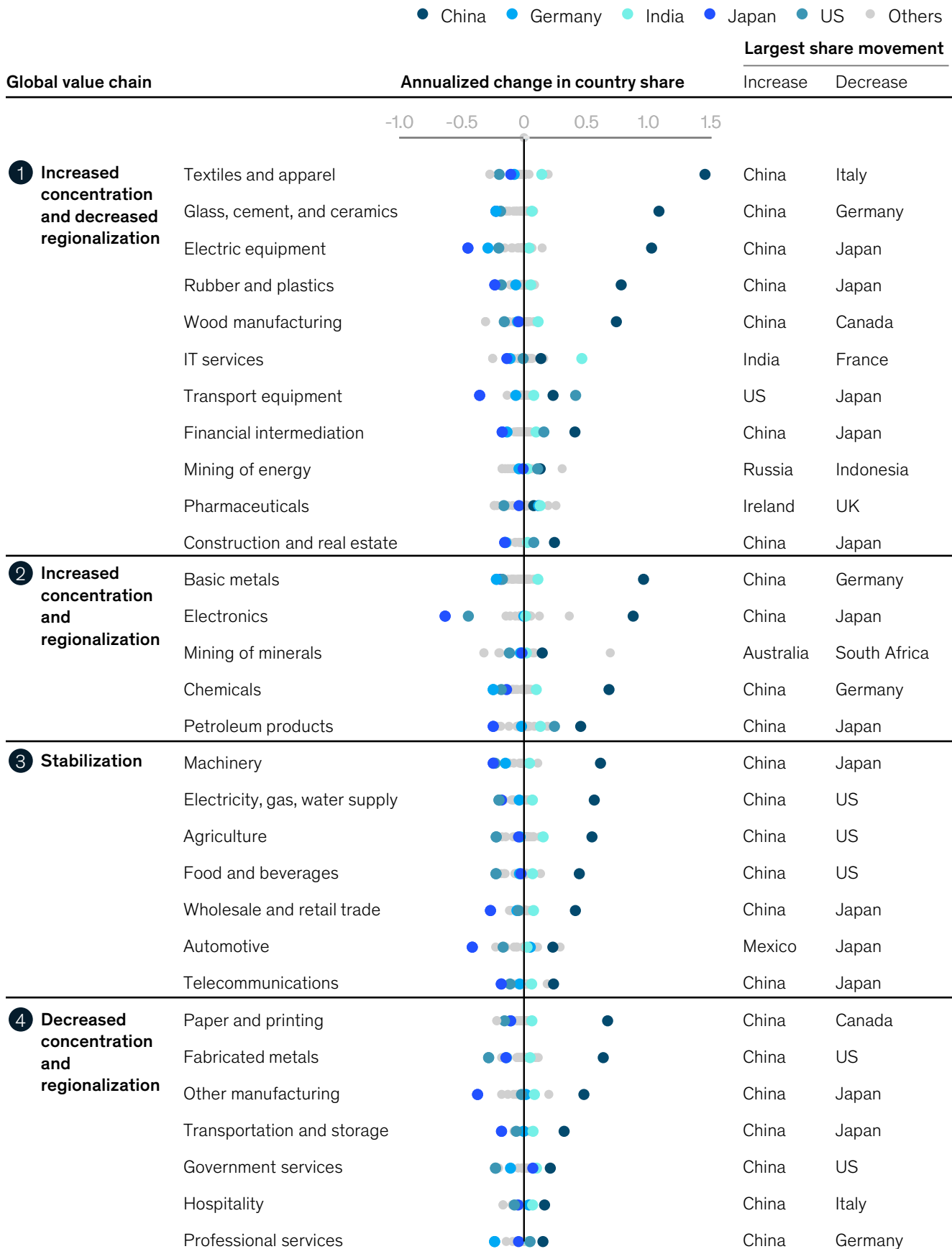
# Patterns of value chain concentration and regionalization split into four different paths.

<sup>29</sup> As a proportion of GDP. In absolute terms, trade flows in economies such as China and India continued to increase.

<sup>30</sup> From a value-added perspective. This research defines movement as changes in the relative share of countries. For example, if country A and B both start with 50 percent of all traded value added, and after ten years country A accounts for 70 percent while country B accounts for 30 percent, a 20-percentage-point movement occurred in that global value chain.

# Global value chains move gradually. No country gained or lost more than 2 percentage points of share of global value chains between 1995 and 2019; China gained the most.

Change in the share of exported value added, percentage points, 1995–2019



Source: McKinsey Global Institute analysis

## Resilience-building, national economic priorities, and stakeholder pressures could now add to established forces shaping value chains

While global trade flows have evolved gradually over the past 30 years, new forces may shape and accelerate their next shifts. There is substantial uncertainty about how individual value chains will respond to changing incentives, but it is likely that different trajectories will emerge.

Spurred by considerations of national security, competitiveness, or resilience, many governments have signaled that they aim to influence the reconfiguration of some value chains. In the case of semiconductors, for instance, China, the European Union, Japan, South Korea, and the United States have all announced measures to bolster domestic value chains. Further moves to decouple technologies and restrict data flows could also influence value chains, especially those that are deemed critical to national strategic priorities.

Other value chains may reconfigure gradually, at something more like their historical pace of change. Efforts to both boost resilience in sourcing and improve responsiveness to demand may exert increasing influence.<sup>31</sup> In response, some supply chains could shorten and become more regional. Manufactured goods value chains also will be influenced by increasing automation, the evolution of wages, and the development of new intangibles hubs. In the Fourth Industrial Revolution, lighthouse manufacturing centers could establish first-mover advantage in scale, logistics, and supply chains, thus establishing new hubs.<sup>32</sup> New hubs are already emerging in textiles, for example.

Services value chains, particularly for intermediate services, may deepen and expand. They still have considerable scope for unbundling as more economies transition to services, opening up new sources of supply. Significant wage differentials between developed and emerging markets persist in services sectors. There remains considerable scope to further liberalize services trade; barriers to trade in most services are two or three orders of magnitude higher than those for goods. Continued advances in technology may enable more seamless digital services trade, including telemigration—the ability to provide services remotely, as happened on a broad front during the pandemic.<sup>33</sup>

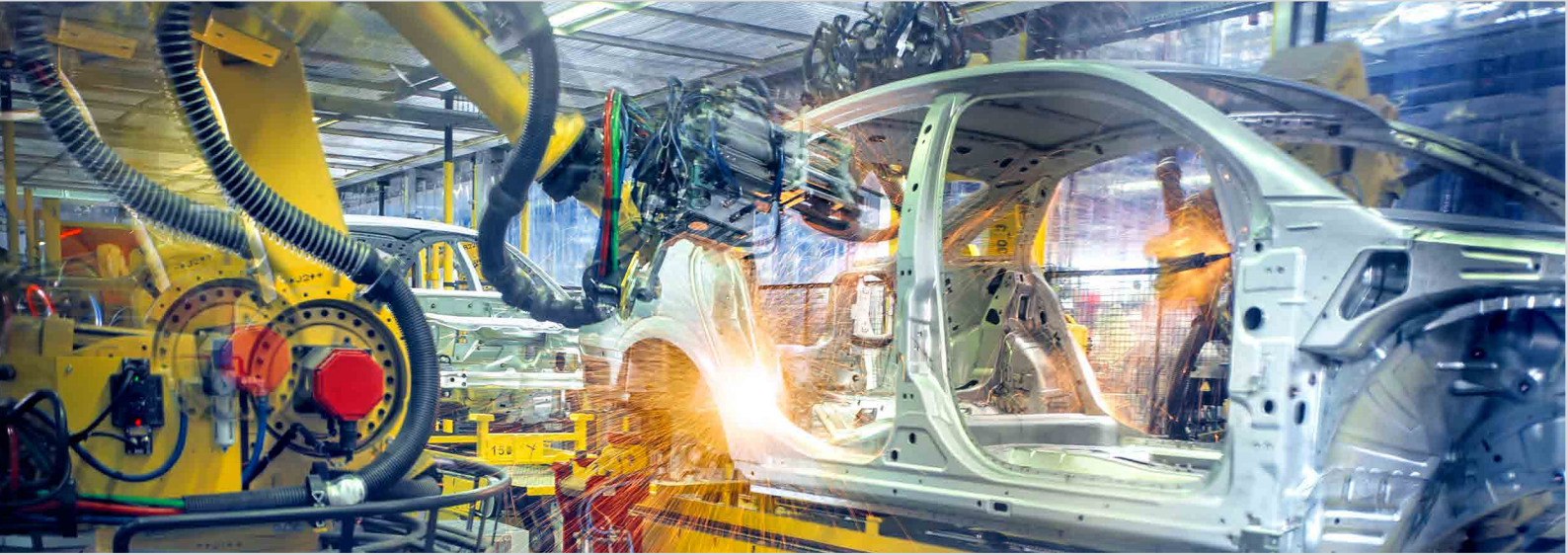
Significant shifts may not materialize in some value chains where the incentives and potential for relocation are lower, for instance when they are less concentrated, already highly regionalized, and highly capital-intensive. Any evolution that does play out may be slower and shaped largely by a rising share of demand from emerging markets. Examples could include food and beverages manufacturing.

**Spurred by considerations of national security, competitiveness, or resilience, many governments have signaled that they aim to influence the reconfiguration of some value chains.**

<sup>31</sup> "Taking the pulse of shifting supply chains," McKinsey & Company, August 2022.

<sup>32</sup> The lighthouses are the factories that have taken Fourth Industrial Revolution technology from pilots to integration at scale, thus realizing significant financial and operational benefits. See Enno de Boer, Helena Leurent, and Adrian Widmer, "Lighthouse' manufacturers lead the way—can the rest of the world keep up?" McKinsey & Company, January 2019; and *114 manufacturers are leading the adoption of advanced technologies*, World Economic Forum, October 2022.

<sup>33</sup> Richard Baldwin, *Globotics and macroeconomics: Globalisation and automation of the service sector*, NBER Working Paper 30317, National Bureau of Economic Research, August 2022.



Images of the automotive value chain.  
© Monty Rakusen, Don Mason, Allan Baxter/Getty Images

# 5. Multinational corporations are key to managing flows for growth and resilience

Global flows are central to the functioning of economies around the world as well as businesses both big and small. Firms rely on the ability to sell in foreign markets, smooth-running global supply chains, and access to the capital, talent, and intangibles they require. Even the smallest firm can find new opportunities to expand its integration with the world, enabled by technological advances, new forms of cross-border finance, and regulation.<sup>34</sup>

Multinational corporations can have a disproportionate influence on flows because they are the current center of the system. This puts them in the eye of the current storm but also in pole position to shape the future in favor of growth and prosperity.

~2/3

of global exports come via multinational corporations

Multinationals account for about two-thirds of global exports and are overrepresented in sectors where intangibles are the most relevant and where concentration is the most pronounced. For instance, they account for about 80 percent of exports in global innovation sectors such as automotive, pharmaceuticals, and electronics where intangibles can be deployed globally at low marginal cost—think, for instance, of developing a new drug or a new smartphone technology.

Previous MGI research identified eight main archetypes of corporations based on which inputs are essential to them and how they create value. Access to foreign markets is crucial for most multinationals, but their dependency varies depending on the type of company and what inputs they require to be successful.

Some multinational corporation archetypes, namely Makers, Deliverers, and Fuelers, rely primarily on trade flows enabling them to move the inputs they require to the final markets where they sell. Discoverers and Technologists are primarily dependent on access to the intangibles and talent they need to create highly specialized products and services.<sup>35</sup> Nonetheless, most multinationals rely on a combination of flows (Exhibit 7).

**Multinationals are in the eye of the current storm but also in the pole position to shape the future in favor of growth and prosperity.**

<sup>34</sup> *Reconceiving the global trade finance ecosystem*, McKinsey & Company, November 2021.

<sup>35</sup> Previous MGI research identified eight archetypes. Makers manufacture a wide range of goods; Deliverers distribute and sell products; Fuelers extract resources to energize the economy; Technologists build the digital economy; Discoverers push the scientific frontier; Financiers price assets and provide capital; Builders make and operate enabling physical infrastructure; and Experts use human capital to deliver services. See *A new look at how corporations impact the economy and households*, McKinsey Global Institute, May 2021.

### Multinational corporations rely on different types of global flows to varying degrees.

Less dependent  More dependent

**x%** Share of revenue, 2018

Company archetype		Reliance on global flows					
		Access to foreign markets (goods and services flows)	Trade flows (flows of goods and services in supply chains)	Capital flows	Intangibles flows (innovation, data)	People flows (labor, human capital)	
Mostly dependent on trade flows	<b>Makers</b> Manufacture a wide range of goods (eg, automotive, textiles)	25	Dark Blue	Dark Blue	Light Blue	Medium Blue	Dark Blue
	<b>Deliverers</b> Distribute and sell products (eg, retailers, distributors, hospitality)	16	Medium Blue	Dark Blue	Light Blue	Light Blue	Dark Blue
	<b>Fuelers</b> Extract resources to energize the economy (eg, oil and gas companies)	8	Dark Blue	Dark Blue	Medium Blue	Light Blue	Light Blue
Mostly dependent on intangibles	<b>Technologists</b> Build the digital economy (eg, semiconductors, social media)	9	Dark Blue	Medium Blue	Medium Blue	Dark Blue	Dark Blue
	<b>Discoverers</b> Push the scientific frontier (eg, pharmaceuticals, beauty companies)	4	Dark Blue	Medium Blue	Light Blue	Dark Blue	Dark Blue
Dependent across multiple flows	<b>Financiers</b> Price assets and provide capital (eg, banks, insurers)	15	Medium Blue	Medium Blue	Dark Blue	Medium Blue	Medium Blue
Moderate dependencies across flows	<b>Builders</b> Make and operate physical infrastructure (eg, telecommunications companies, utilities companies)	16	Light Blue	Medium Blue	Medium Blue	Medium Blue	Light Blue
	<b>Experts</b> Use human capital to deliver services (eg, healthcare and education)	6	Medium Blue	Light Blue	Light Blue	Medium Blue	Medium Blue

Source: McKinsey Global Institute analysis



# 40–60%

of the enterprise value of a typical auto manufacturing multinational could be at stake

Multinationals have substantial value at stake from ensuring that global flows are working well. The amount at risk depends on both the sector and idiosyncratic features of each company. To give an example, should a typical manufacturing multinational in the automotive sector experience simultaneous shocks that prevent it from securing the global flows it needs, as much as 40 to 60 percent of its enterprise value could be at risk. Although the relative magnitude of the impact of different types of disruption can vary significantly for different multinationals, that impact is likely to be substantial for all.

Often, the same flows that create dependency are also a source of competitive advantage. It is therefore important to understand in detail areas of interdependency in flows, opportunities to increase participation, and options for mitigating risk. Armed with that intelligence, businesses can position themselves for the current and next evolution of global interconnectedness. The following three particular areas are worth considering:

- **Look for growth opportunities.** Companies that remain heavily invested in global flows can find new growth opportunities. The upside is proportionately higher for multinationals but also exists for smaller firms. For knowledge-intensive multinationals, further engagement with new sources of intangibles flows and human capital can unlock deeper competitive advantage. For example, the Owkin-led MELLODDY project used decentralized data from ten leading pharmaceutical companies to tweak models that predict molecule behavior in the hope of accelerating the drug discovery process.<sup>36</sup> This increase in intangibles flows led to faster innovation cycles. In some cases, these flows can unlock new business models in sectors that were previously less driven by knowledge flows, thereby transforming goods business models into services ones. Over the past 20 years, Schneider Electric has transitioned from electrical power and control systems to energy resources and automation digital solutions.<sup>37</sup>
- **Build resilience of their own organizations.** Firms can explore ways to strengthen the resilience of their own organizations not only in terms of having stable supply chains to access the inputs they need, but also their ability to operate in multiple foreign markets. On the former, transparency in supply chains and scenario planning can enable firms to understand potential areas of risk where diversification could be a priority. One example of diversification is Apple's announced plan to expand manufacturing in India and Vietnam.<sup>38</sup> In some cases, diversification may not be feasible and firms might instead consider developing privileged supplier relationships, building strategic inventories, or both. In some cases, developing capabilities to redesign products to substitute required inputs may be the best protection against exposure to risk from disruption. Electric vehicle manufacturers, for instance, are increasingly shifting away from batteries based on cobalt and vertically integrating some sources of minerals.<sup>39</sup> In terms of the ability to serve foreign markets, localization of operations, innovation, data, and technology or even spin-offs may be required to continue serving some large markets. Siemens Healthineers has announced a new strategy in China that includes promoting the localization of full product lines and bolstering innovation based on the needs of the Chinese market.<sup>40</sup>

## Often, the same flows that create dependency are also a source of competitive advantage.

<sup>36</sup> Hannah Kuchler, "Pharma groups combine to promote drug discovery with AI," *Financial Times*, June 5, 2019.

<sup>37</sup> In 2021, the company launched EscoStruxure Outcomes, which provides a microdata center solution as a service. See Benjamin Wilson, *Why micro data centre as a service should be a key component of your IT strategy*, Schneider Electric, August 2021.

<sup>38</sup> Yang Jie, "Apple looks to boost production outside China," *Wall Street Journal*, May 21, 2022.

<sup>39</sup> Marcelo Azevedo, Nicolò Campagnol, Toralf Hagenbruch, Ken Hoffman, Ajay Lala, and Oliver Ramsbottom, "Lithium and cobalt: A tale of two commodities," McKinsey & Company, June 2018.

<sup>40</sup> He Wei, "'Localization' buzzword for Siemens Healthineers in China expansion," *China Daily*, June 15, 2022.

- **Find opportunities to forge system-level resilience.** Multinational corporations can use their central role in global flows to forge systemic resilience through public–private or private-sector partnerships that may enable them to become more resilient than if they were to act alone. Smaller companies can consider acting in conjunction with trade associations or other groups. These partnerships can help prevent and respond to shocks. One example of a public–private partnership dedicated to bolstering supply chain resilience is the Freight Logistics Optimization Works (FLOW) initiative launched by the US government in 2022. The effort has been given a mandate to develop a freight information exchange.<sup>41</sup>

These efforts are particularly important now. The world has never been more connected. Yet businesses are also confronted with the complexities of an increasingly contested global order. The rules of the international system created after World War II are under significant strain, and operating in one market can create significant risks in another that need to be proactively managed.

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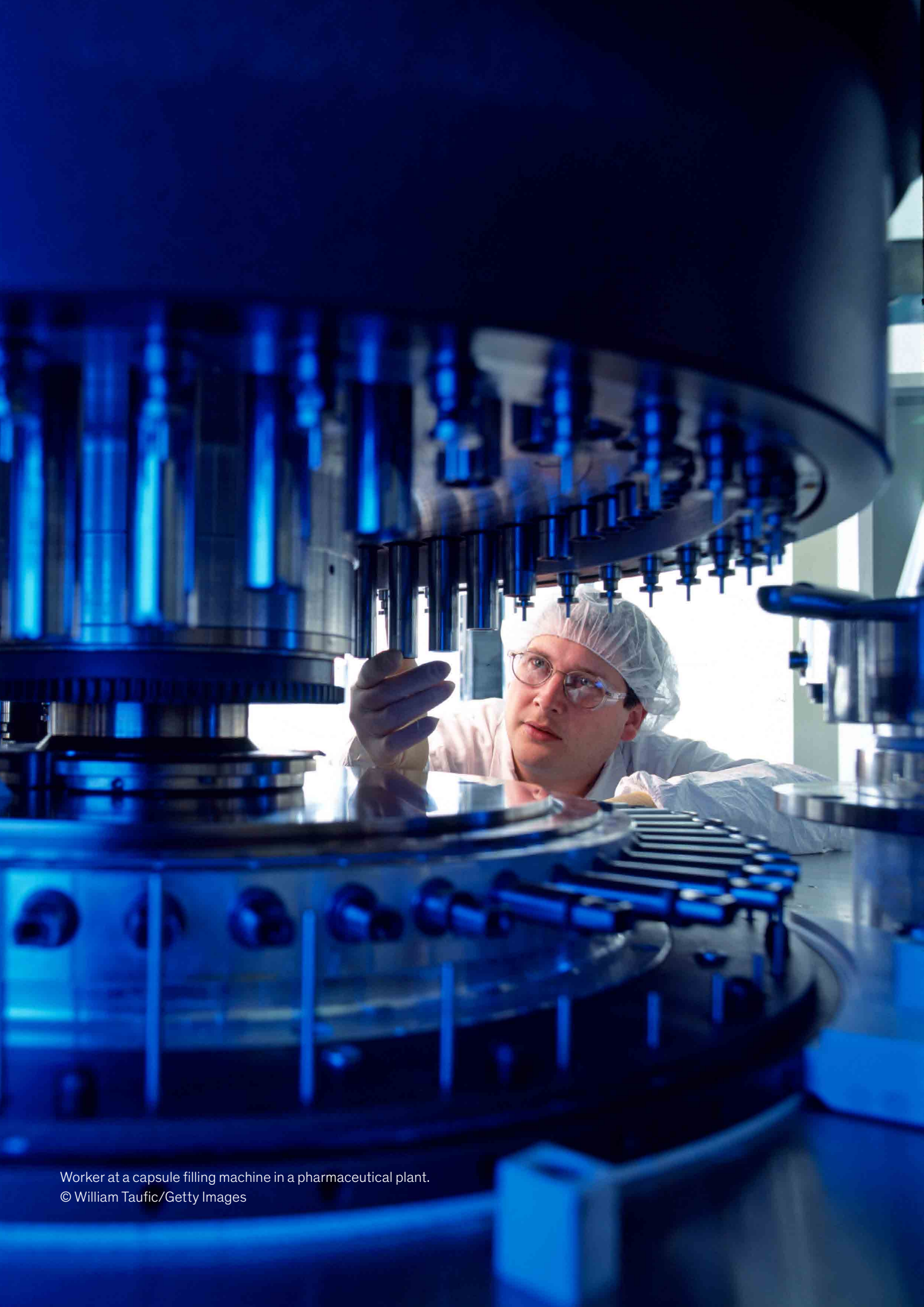
To negotiate an era that may be more complex and challenging requires a deeper understanding of the full picture of global flows, their networks and evolution, and potential scenarios for the future. Looking at the entire range of global flows, it is clear that the world is not defaulting to deglobalization, but rather that global connections are reconfiguring. Firms that reimagine rather than retreat from interconnection can reshape value chains in ways that contribute to both growth and resilience.

**Looking at the entire range of global flows, it is clear that the world is not defaulting to deglobalization, but rather that global connections are reconfiguring.**

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<sup>41</sup> *Fact sheet: Biden-Harris administration announces new initiative to improve supply chain data flow*, The White House, March 15, 2022.





Worker at a capsule filling machine in a pharmaceutical plant.  
© William Taufic/Getty Images

# Acknowledgments

The McKinsey Global Institute has been studying the global flows that connect our world for some years. In this discussion paper, MGI looks at the full range of global interconnections through analysis of global flows of trade, capital, people, data, and ideas.

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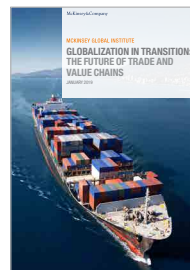
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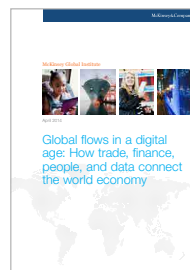
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