▶ Policy Brief

June 2020

COVID-19 and global supply chains: How the jobs crisis propagates across borders*

Key points

▶ The COVID-19 pandemic caused a **collapse in consumer demand** and prompted governments to put in place unprecedented **lockdown measures** including workplace closures. Due to their complexity, supply chains linked to manufacturing play an important role in propagating the economic impact across multiple sectors and countries.

▶ As of 3 June 2020, **292 million jobs in manufacturing supply chains are at high risk due to the COVID-19-related drop in consumer demand**, and a further 63 million jobs are at medium risk. Workers on these jobs in affected supply chains are likely to suffer from reduced incomes, reduced working hours or unemployment.

▶ Hence, **more than half of all jobs in manufacturing supply chains, and more than one in seven of all jobs, are currently at medium or high risk**, threatened by the drop in consumer demand. The share of jobs at high risk is greatest in the Asia and the Pacific region.

▶ As of 3 June 2020, **the manufacturing sector was experiencing a disruption to 35 per cent of imported input supply due to closures of all but essential workplaces**. Input supply disruptions are currently most severe in the Americas.

▶ The lack of key inputs can represent a serious obstacle to enterprises to maintain their production, and for workers to earn an income. Estimates suggest that this in particular poses a risk to **255 million workers in manufacturing sectors with a high or medium vulnerability to imported input supply disruption, corresponding to 69 per cent of manufacturing employment**.

▶ **Smaller countries tend to be more vulnerable to input supply disruption**, as they often have to rely extensively on imported inputs, and have a less diversified foreign supplier network.

▶ The international propagation of the COVID-19 crisis through demand and supply disruptions calls for **continued support for enterprises and workers around the world on an unprecedented scale** across the four pillars of the ILO's COVID-19 Policy Framework.

▶ Introduction

To limit the spread of COVID-19, governments have been forced to put in place lockdown measures, which have severely affected enterprises and workers globally. The international connectedness of production through global supply chains implies that lockdown measures taken in one country can have a significant impact on production and jobs in other countries. Supply chains linked to manufacturing are particularly complex and stretch across multiple countries and sectors, which plays an important role in propagating the economic impact of lockdown measures not only domestically, but also across borders (ILO, 2020a; Solleder and Torres-Velasquez, 2020).

There are two main channels through which production and jobs are impacted: First, the lack of consumer confidence, declining purchasing power that results from job and income losses, and the introduction of lockdown measures such as shop closures or travel restrictions have contributed to a **sharp decrease in global consumer demand**. Second, workplace closures have disrupted the supply of inputs across borders, causing a **lack of inputs** that are **vital for the production** of at least some manufacturing enterprises. ILO (2020a) discusses the supply and demand channels relevant during this crisis as well as the implications for workers and enterprises.

This policy brief presents ILO's new estimates of **the number of jobs that are at risk of being affected** through these two channels of disruption. The analysis takes into account all direct and indirect, national and international supply chain linkages between sectors and countries, using the OECD's Inter-Country Input-Output tables, in combination with ILO's estimates of employment by sector. It covers 64 countries, which account for 74 per cent of the global labour force.[1]

Already **at early stages** of the COVID-19 pandemic, there were **reports about disruptions to demand and supply**, following the introduction of strict lockdown measures in the Hubei province as well as in other parts of China in late January and February. Already at the time, enterprises reported a significant decline in consumer demand of Chinese customers. For example, car sales in China fell by 92 per cent in the first half of February, according to reports from an industry trade body (BBC, 2020). There were also multiple reports of disruptions to input supply in several sectors within and outside China as early as February (ILO, 2020a).

As the COVID-19 pandemic spread across the world, these disruptions have become more severe, driven by lockdown measures taken by additional countries and affecting more sectors worldwide.[2] Although businesses and workplaces are starting to open up in some countries, with lockdown measures being gradually lifted, **global consumer demand is expected to remain low, also driven by job and income losses**. In addition, input supply disruptions are likely to continue since not all producers manage to return to normal activity level despite the lifting of workplace closures, especially when supply chains are complex. Indeed, a recent survey by the ILO found that 55 per cent of enterprises expect shortages of input supply to last throughout the year 2020.[3] The **impact on both the demand and supply side** is contributing to the ongoing collapse in international trade[4], and is likely to remain relevant in the coming months.

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[1] See Annex 1 for more details. The relevant literature generally applies input-output modelling with multinational tables to estimate aggregate relationships, as opposed to case studies that shed light on specific supply chains. We follow Timmer et al (2014) in identifying jobs in manufacturing supply chains, meaning all jobs that contribute directly and indirectly to the production of final manufactured goods. Part of those jobs can be located within the same country where the final good is sold, meaning that this methodology captures both domestic and international supply chains. To account for the supply chain of imported inputs, we apply a similar method as Jiang (2013) uses to identify employment embedded in global production networks.

[2] See Oxford COVID-19 Government Response Tracker database: https://www.bsg.ox.ac.uk/research/research-projects/coronavirus-government-response-tracker.

[3] The survey was conducted among 1000 enterprises participating in the ILO's Sustaining Competitive and Responsible Enterprise (SCORE) program between February and April 2020. At the time of the survey, 67 per cent of enterprises experienced input supply disruptions. The SCORE program is an ILO global programme that improves productivity and working conditions in small and medium enterprises. Further details can be found in ILO (2020b).

[4] On 8 April 2020, the World Trade Organization estimated global trade to fall by between 13 and 32 per cent in 2020: https://www.wto.org/english/news_e/pres20_e/pr855_e.htm.

The severity of the supply and demand disruptions, and their impact on workers and enterprises through global supply chains, call for continued **large-scale support for enterprises and workers** around the world. The four pillars of the ILO's COVID-19 Policy Framework provide guidance for the design of policy responses, based on **international labour standards,** addressing adverse impacts on workers and enterprises. Social dialogue plays an important role to navigate the temporary and permanent challenges for enterprises and workers in the course of this crisis.

Structure of the brief

The following section discusses how the decline in retail activity threatens the jobs of millions of workers in the affected sectors themselves, as well as all those linked to these activities through supply chains. The section thereafter investigates the degree to which workers and firms are affected by disruptions of input supply chains due to workplace closures in other countries. The final section concludes and discusses policy measures.

▶ The collapse in consumer demand is causing hardships in the world of work

Low consumer confidence and lockdown measures are weighing on consumer demand

Consumer confidence collapsed globally at the fastest speed in recent history in March and April 2020. Based on available data, average confidence fell drastically in March and April, reaching the lowest levels measured during the financial crisis of 2008-09 (figure 1). During the latter, it took 20 months for consumer confidence to fall by that much, highlighting the extraordinary pace and scale of the COVID-19 crisis.

▶ **Figure 1. Consumer confidence collapsed fast**
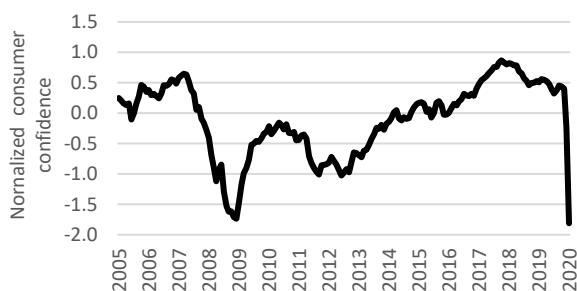
Note: This chart shows the monthly unweighted average of a normalized index for consumer confidence from May 2005 to April 2020 in a sample of 40 countries. Normalization rescales consumer confidence indices to the distance in standard deviations around their mean.
Source: ILO calculations based on databases by OECD, Trading Economics, Bank of Indonesia, INSEE, University of Michigan, Turkstat.

The government measures imposed to curb the spread of COVID-19 weigh heavily on economic activity. An analysis of recent data suggests that shop closures, in combination with the loss of consumer confidence and purchasing power, depressed monthly retail sales growth by on average 9.7 percentage points for medium levels of stringency of lockdown restrictions, and by on average 25.4 percentage points for high levels of stringency (figure 2), compared to low levels of stringency. For the latter, retail sales growth was on average still positive, as low levels of stringency are associated with measures such as travel bans, which have relatively small impacts on retail activity.

Collapsing retail sales endanger the livelihoods both of workers in the retail sector and **those producing the manufactured goods.** The latter group of workers includes not only those in the manufacturing sector itself, but also in agriculture or services. For example, farmers on rubber or cotton plantations provide inputs into the production of car wheels or garments; product designers, software developers or marketing specialists work in the services sector, but provide inputs into the production of mobile phones or cars. Those jobs are likewise affected by the drop in consumer demand for manufactured goods, as they contribute to the production of these goods.

Not all manufactured goods have experienced an equal drop in demand in course of the crisis, as some, such as

food products and pharmaceuticals, are essential items. The drop in demand also depends on the stringency of lockdown measures imposed, and will be higher when shops are closed and physical distancing rules are strictly implemented. This policy brief **classifies manufacturing sectors into having a low, medium or high risk of**

seeing the consumer demand for their products fall in response to the crisis, dependent on the country in which consumers undertake their purchases. This risk assessment is based on data on retail sales, sectoral stock market price indices, as well as the stringency of lockdown measures.[5]

▶ **Figure 2: Retail sales are taking a stronger hit in countries with more stringent lockdown measures**
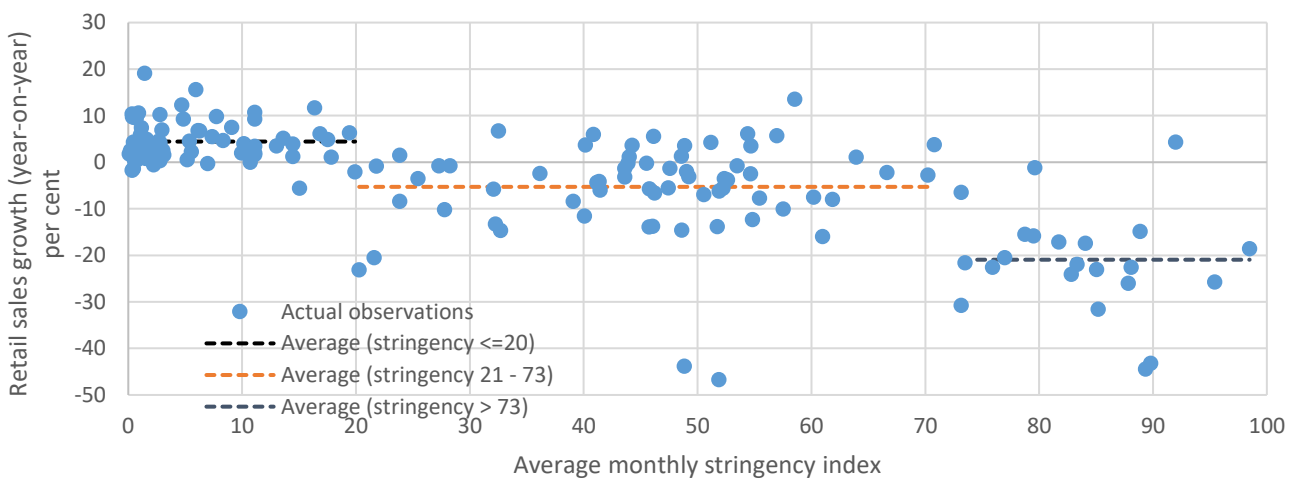
Note: The average monthly stringency index measures the level of stringency averaged over all days within a month. Monthly retail sales growth is seasonally adjusted. The dashed line shows the average retail sales growth in months and countries where stringency is in the specified range. These ranges were estimated to maximize the statistically significant difference between the corresponding averages. Only observations for which the average monthly stringency index is strictly greater than zero are included. The sample includes 35 countries in January, 45 in February, 52 in March, and 26 in April 2020.
Source: ILO calculations based on Tradingeconomics, Oxford COVID-19 Government Response Tracker database (4 June 2020).

Sharp declines in retail activity put the jobs of millions of workers at risk

As of 3 June 2020, 292 million jobs in manufacturing supply chains are at high risk due to the COVID-19-related drop in consumer demand, and a further 63 million jobs are at medium risk (figure 3). Taken together, more than one in two jobs in manufacturing supply chains, and more than one in seven of all jobs, are currently still at medium or high risk, despite the recent easing of lockdown measures in some countries. Most of these workers are likely to suffer from unemployment, reduced incomes, reduced working hours or other

downward pressures on labour standards and working conditions, while their employers could experience financial shortfalls or even insolvency, leading to cuts in investment and layoffs.

Among the jobs that are at high risk, 167 million jobs are in the manufacturing or other industrial sectors. 29 million jobs are in agriculture and 96 million jobs are in services, which supply inputs into manufacturing. Services workers are suffering directly from the crisis through many channels, such as the drastic decline in tourism or the closure of shops and businesses. This analysis shows that in addition, the impact on service sector workers through the lower demand for manufactured goods is sizeable. [6]

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[5] See Annex 1 for more details.

[6] For recent evidence on the impact of COVID-19 on workers in the tourism sector, see for example: ILO, 2020c.

▶ Figure 3: The COVID-19-related drop in consumption puts jobs at risk in manufacturing supply chains (millions)
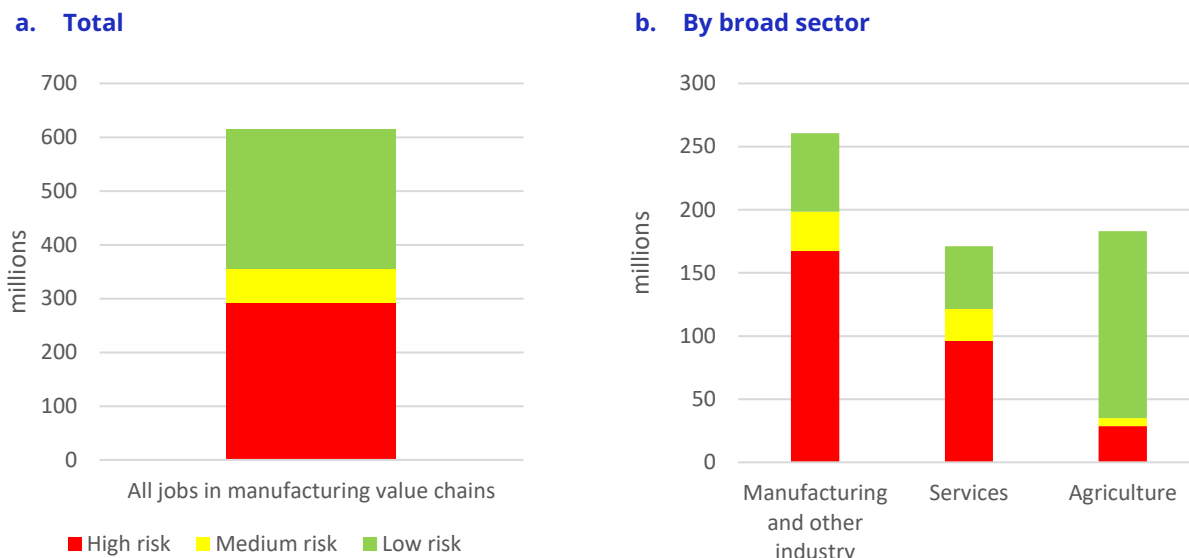
a.   Total

b.   By broad sector

Note: Estimates are based on data for 64 countries that account for 74 per cent of the global labour force. See Technical annex 1 for further details.

▶ Table 1. The COVID-19 related drop in consumptions hits hard jobs in multiple supply chains

	Share of supply chain jobs in total employ-ment (per cent)	Jobs sustained by consumer demand in different countries, by level of stringency of lockdown measures in place (millions)		Total jobs at high risk due to drop in consumer demand (millions)	Share of female jobs in supply chain jobs (per cent)
		High stringency	Medium stringency		
Food and beverages supply chains	10.1	174	75	0	36.8
Textiles and garments supply chains	3.0	40	34	73	46.2
Motor vehicles supply chains	2.2	29	25	54	35.6
Machinery and equipment supply chains	2.0	34	15	34	37.6
Electronics supply chains	1.4	17	17	17	49.8
Chemicals and pharmaceuticals supply chains	1.1	16	11	0	39.5
Electrical equipment supply chains	0.9	15	8	15	40.2
Other manufacturing supply chains	4.3	52	54	99	32.5
All manufacturing supply chains	**25.0**	**376**	**239**	**292**	**38.1**

Note: Estimates are based on data for 64 countries that account for 74 per cent of the global labour force. As of 3 June 2020, there are no countries with lockdown measures of low stringency. Red cell indicates workers at high risk. Yellow cell indicates workers at medium risk. Yellow-red striped cell indicates workers at high or medium risk. Green cell indicates workers at low risk. Orange cells indicate a higher than average share of female jobs in total supply chain jobs. See Annex 1 for details. See table A3 in Annex 2 for more disaggregated data on "other manufacturing supply chains".

73 million jobs are at high risk in textiles and garments supply chains, representing one in four of all jobs at high risk (table 1)**.** Order cancellations and inability to pay for orders in production, due to the lack of consumer demand for garments, threaten in some cases the ability of enterprises in those supply chains to pay their workers, who disproportionately are women in lower-middle-income countries (box 1). Additionally, an estimated 54 million jobs in motor vehicles supply chains are at high risk (ILO, 2020d). The complete collapse of consumer demand for these manufacturing products, regardless of a country's stringency of lockdown, means that jobs in these supply chains are currently at high risk.

66 million jobs in electronics supply chains, electrical equipment supply chains and machinery and equipment supply chains are at high risk, as they depend on demand from consumers in countries with lockdown measures of high stringency in place. There are also 99 million jobs in other manufacturing supply chains that are currently considered to be at high risk (see table A3 in Annex 2 for more details).

The stringency of lockdown measures has been changing over time in many countries, having an impact on how many jobs are at high risk at any particular point in time. The **292 million jobs in manufacturing supply chains that are at high risk, as of 3 June 2020, correspond to 11.9 per cent of total employment** (figure 4)**.** This share has remained relatively stable over recent weeks, with a small recent increase related to the re-introduction of lockdown measures in parts of China. By region, **jobs in manufacturing supply chains located in Asia and the Pacific have been most heavily affected by the drop in demand**. In this region, often referred to as the "factory of the world", jobs in manufacturing supply chains that are at high risk account for 13.2 per cent of total employment. This share stands at 9.8 per cent in Europe and Central Asia and 8.8 per cent in the Americas. It is 7.8 per cent for those countries in Africa and Arab States, for which estimates are available (see table A4 in Annex 2 for more details).

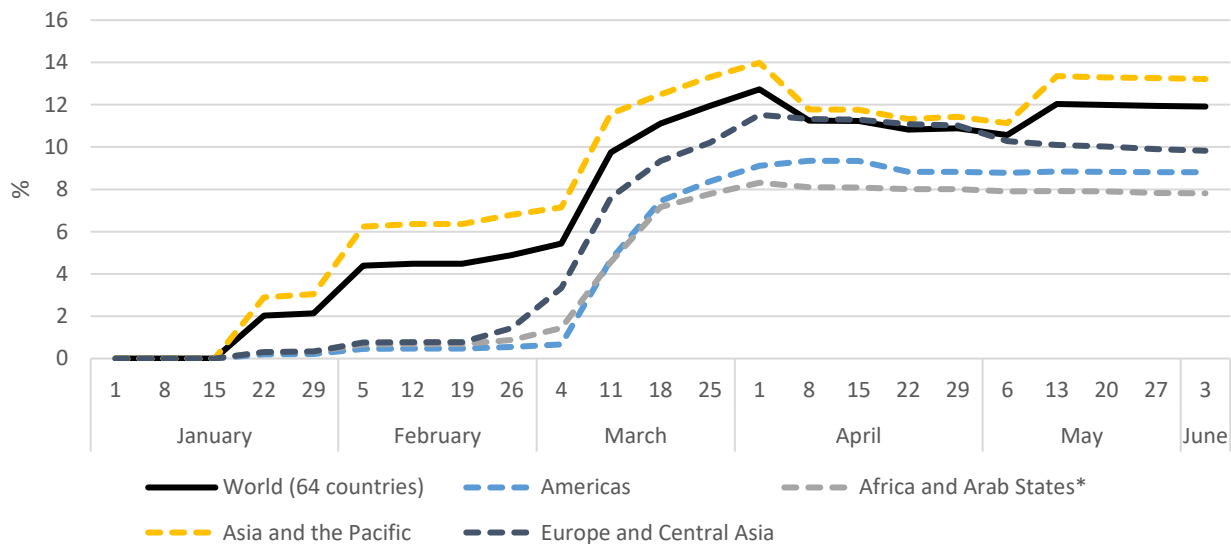▶ **Figure 4: The share of jobs at high risk in total employment remains alarmingly high in all regions**

Note: Estimates are based on data for 64 countries that account for 74 per cent of the global labour force. See Annex 1 for further details. For Africa and Arab States, the data is based on information for four countries only and hence not representative.

▶ **Box 1: COVID-19 and the garment sector**

Although some countries have recently begun to ease lockdown measures, consumers have not returned to previous spending patterns yet: in a survey conducted in the United States, 56 per cent of consumers said they are reducing spending, and 48 per cent said economic uncertainty is holding them back from purchases they were planning to make. In China, where more than 90 per cent of clothes shops reopened, garment sales at least initially remained 50 to 60 per cent lower than pre-crisis (McKinsey, 2020). In Germany, more than half of the respondents of a survey had not gone shopping for non-essential items, despite shops reopening (Thomasson, 2020).

The dramatic collapse in consumer demand, including demand for garments, is having a devastating impact on global fashion brands, with the global fashion industry expected to contract by up to 30 per cent in the current year (McKinsey, 2020; ILO, 2020e). Fashion brands cancelled garment orders[7] and in some cases were unable to pay for those already in production, affecting Asian suppliers and their workers (Centre for Global Workers Rights, 2020). As of 4 April 2020, 15,000 garment jobs had been lost in Myanmar and 18,000 workers had been furloughed in Cambodia (The Straits Times, 2020). A survey of Bangladesh employers found that one million workers have already been furloughed or fired. In many cases, these workers were sent home without pay (Anner, 2020). The Call to Action *COVID-19: Action in the Global Garment Industry* is a joint effort, endorsed by brands and manufacturers, trade unions as well as the ILO, to catalyse action from across the global garment industry to support manufacturers, and protect garment workers' income, health and employment.[8]

This support is of utmost importance, as garments and textiles make up a significant share of exports of goods in several economies in Asia: 91 per cent in Bangladesh, 67 per cent in Cambodia, 27 per cent in Myanmar, and 14 per cent in Vietnam in 2018 (OEC, 2020). In Cambodia, one in five households receives income from the garment sector (ILO, 2019). Globally, 91 million persons worked in the textiles and garments sector in 2019, 50 million women of which are women, or 55 per cent. In Asia and the Pacific, more than 5 per cent of women were employed in this sector, making it the largest employer for women among all of the industrial sectors, and the fourth largest overall. Furthermore, among all jobs in the textiles and garments supply chain within the 64 countries with available estimates, 82 per cent are located in Asia and the Pacific.

▶ Disruptions of input supply due to workplace closures are continuing to affect the world of work

Widespread workplace closures seriously disrupt manufacturing supply chains, putting millions of jobs at risk

Workplace closures in one country have potentially serious repercussions in other countries, if they disrupt the supply of inputs into production from one country to another. Supply disruptions become even more impactful when many countries close workplaces as a result of the pandemic. Once input inventories are depleted, this can present a serious obstacle for enterprises to maintain their production, and for workers to earn an income.

At the height of the first wave of the COVID-19 pandemic, almost 60 per cent of all imported inputs were disrupted

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[7] According to the International Textile Manufacturers Federation, which conducted a survey among its members at the end of April, orders declined by 41% worldwide. See ITMF: "Press release: 3nd ITMF-Survey about the Impact of the Corona-Pandemic on the Global Textile Industry", ITMF, 29 Apr. 2020.

[8] See Call to Action: COVID-19: Action in the Global Garment Industry: https://www.ilo.org/global/topics/coronavirus/sectoral/WCMS_742343/lang--en/index.htm

due to mandatory closures of all but essential workplaces. The ILO's survey among SCORE participants corroborates these estimates, finding that 67 per cent of enterprises experienced shortages of supply between February and April.[9]

On 3 June 2020, enterprises in the manufacturing sector and their workers still experienced, on average, a disruption of 35 per cent of their imported input supply due to closures of all but essential workplaces (figure 5), down from almost 60 per cent in the beginning of April. Following a drop in the level of disruption during April, it has remained stable at a relatively high level since

then. This disruption of input supply chains is likely to restrain the recovery of economic activities in countries that can open up workplaces, all the more so because suppliers will need time to adjust to the new circumstances before being able to return to pre-crisis levels of activity, once workplace closures are lifted. Furthermore, the lack of just one vital input can disrupt the entire supply chain. In light of this, it is of no surprise that 55 per cent of enterprises surveyed by the ILO expect shortages of supply to last throughout the year 2020 (ILO, 2020b).

▶ **Figure 5. Degree of imported input supply disruption due to mandatory workplace closures**
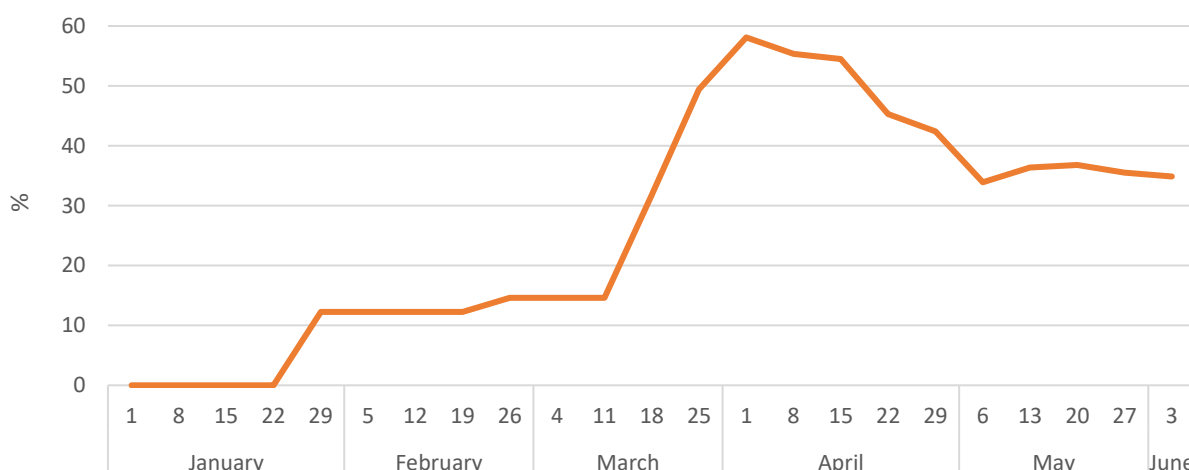
Note: The figure shows the employment-weighted average percentage of imported intermediate input supplies that are sourced from countries with required closures of all but essential workplaces. Calculations are based on data for 64 countries that account for 74 per cent of the global labour force. See Annex 1 for details.

Imported input supply disruptions are currently the highest in the Americas (figure 6). In this region, 56 per cent of the imported input supply is currently disrupted due to closures of all but essential workplaces. The Americas is followed by Asia and the Pacific (34 per cent). Africa and Arab States (29 per cent) and Europe and Central Asia (23 per cent).

Workplace closures in global supply chains negatively affect expected firm performance: for every ten percentage points of overall input supplies that have been disrupted due to workplace closures in foreign countries,

the stock price index of a sector fell by an additional 3.5 percentage points.[10] Consequently, the reliance on imported intermediates generates a vulnerability in case of a widespread resurgence of workplace closure measures. Even in case where such measures are only introduced in a limited set of countries, intermediate inputs can seriously be disrupted in case those depend on exactly those countries. This means that when the source of imported inputs is highly concentrated in few countries, a sector has a potentially higher vulnerability to supply chain disruptions in case of local lockdowns.

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[9] See footnote 3.

[10] The result is derived by regressing the manufacturing sector's 3-month stock index return for the period from 17 January to 16 April 2020 at the country level on the share of intermediates that are disrupted due to foreign workplace closures, the share of exports of the sector, and sectoral dummies. The t-value of the slope coefficient is 3.2 and hence statistically significant.
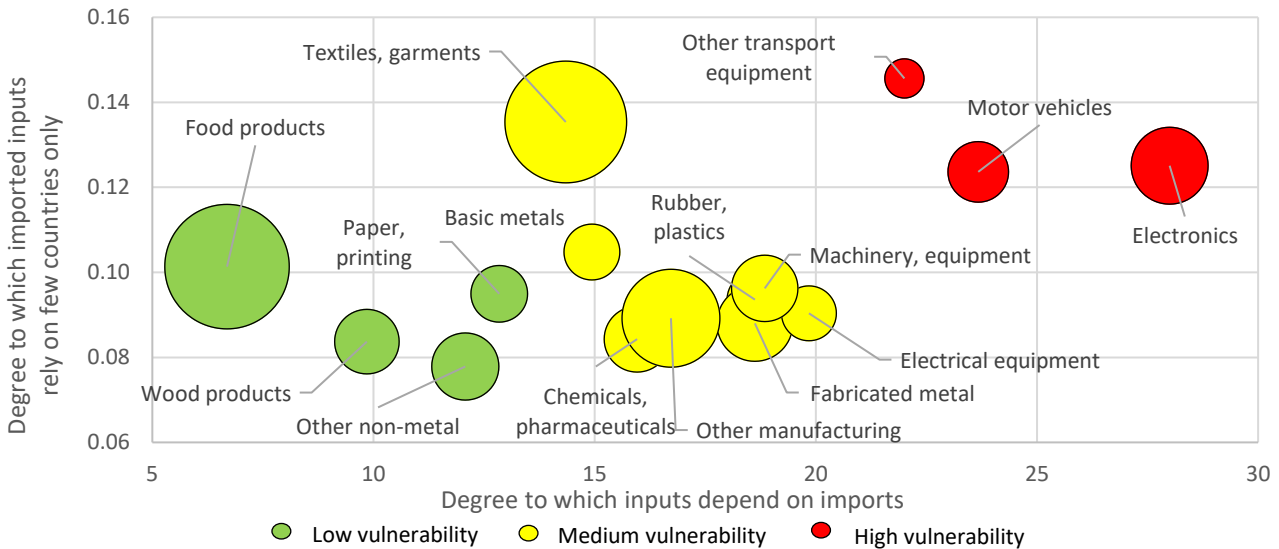
▶ **Figure 6. Input supply disruptions are highest in the Americas**
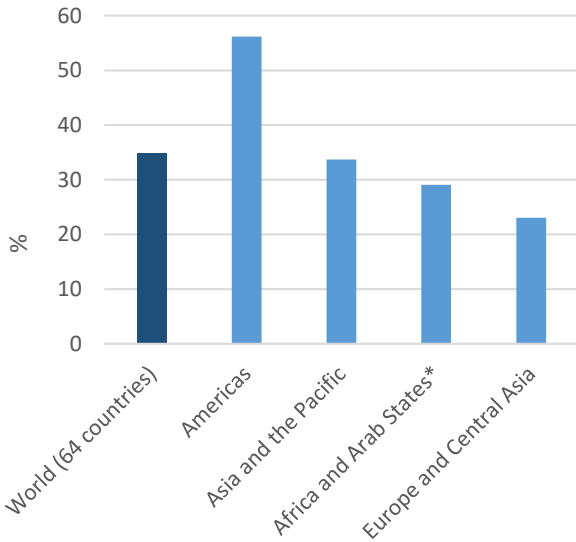
Note: The figure shows the employment-weighted average percentage of imported intermediate input supplies that are sourced from countries with required closures of all but essential workplaces. Calculations are based on data for 64 countries that account for 74 per cent of the global labour force. For Africa and Arab States, the data is based on information for four countries only and hence not representative. See Annex 1 for details.

(bar chart, y-axis "%" from 0 to 60)

- World (64 countries): ~35
- Americas: ~56
- Asia and the Pacific: ~34
- Africa and Arab States*: ~29
- Europe and Central Asia: ~23

▶ **Figure 7. Global production in many sectors relies on imported inputs from few countries**

(bubble chart. Vertical axis: "Degree to which imported inputs rely on few countries only" from 0.06 to 0.16. Horizontal axis: "Degree to which inputs depend on imports" from 5 to 30.)

Labelled bubbles: Textiles, garments; Other transport equipment; Food products; Paper, printing; Basic metals; Rubber, plastics; Motor vehicles; Machinery, equipment; Electronics; Wood products; Other non-metal; Chemicals, pharmaceuticals; Other manufacturing; Fabricated metal; Electrical equipment

Legend: ● Low vulnerability (green) ○ Medium vulnerability (yellow) ● High vulnerability (red)

Note: The size of the bubbles shows employment in the sector. The horizontal axis shows the degree to which inputs depend on imports, indicating to what extent the use of inputs could be disrupted by workplace closures implemented in foreign countries. It is measured by the employment-weighted average share of imported intermediate inputs in total inputs used for each sector, across the 64 countries of the OECD's inter-country input output database. The vertical axis shows the degree to which imported inputs are sourced from few countries only, which causes a problem in case exactly those countries impose workplace closures. It is measured by the employment-weighted average Herfindahl concentration index of imported intermediate inputs from source countries. The coke and refined petroleum products sector is excluded from the chart for clarity of exposition. See Annex 1 for details.

255 million workers are in sectors with a high or medium vulnerability to imported input supply disruption, corresponding to 69 per cent of manufacturing employment. The sectors with high vulnerability account for 49 million of these jobs, which includes jobs in the electronics, motor vehicles, and other transport equipment (see table A5 in Annex 2 for more details). The high dependency on imported as opposed to domestic input supply, and the high concentration of their foreign input supplier networks on only one or a few countries, renders these sectors more vulnerable to current and future workplace closures, for example as a response to a second wave of infections (figure 7).

Smaller countries are, on average, more vulnerable to imported input supply disruptions than larger countries (figure 8). For one, they rely more on imported inputs, since it is less likely that all components, which can be highly specialized, are produced within the country. Second, smaller countries' imported inputs tend to be sourced from fewer countries. This is also the case, when

countries are highly integrated with a larger neighbour country (such as Cambodia with China, or Canada and Mexico with the United States). Germany has the most diversified network of imported input suppliers among all countries, but nevertheless saw up to 70 per cent of imported inputs disrupted due to the global nature of the pandemic and the ensuing policy responses.

▶ **Figure 8. Production in small countries tends to be particularly vulnerable**
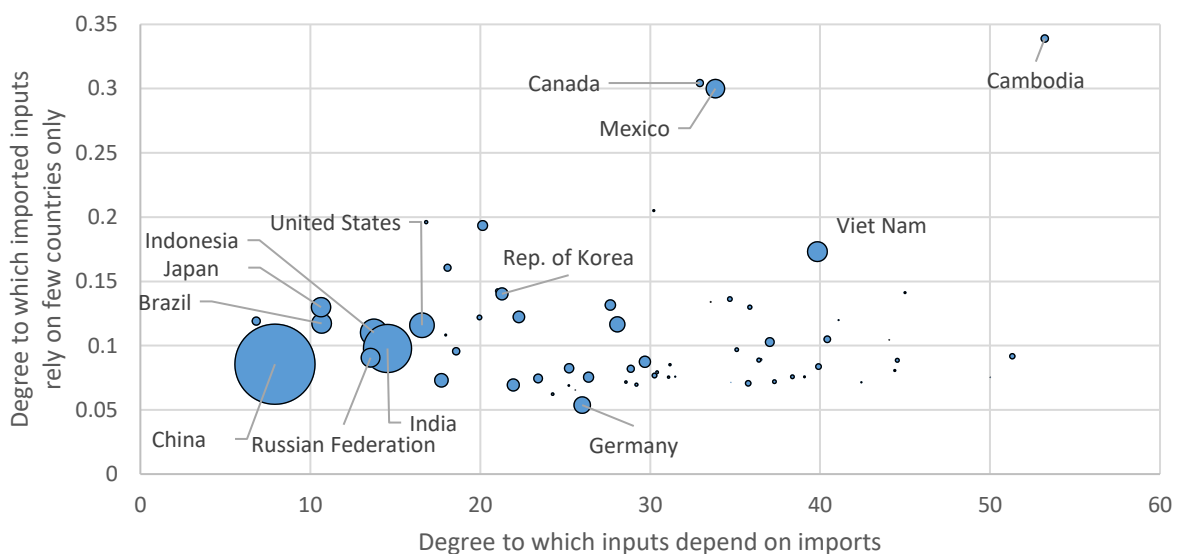
Note: The size of the bubbles shows total manufacturing employment in the country. The horizontal axis shows the degree to which inputs depend on imports, indicating to what extent the use of inputs could be disrupted by workplace closures implemented in foreign countries. It is measured by the employment-weighted average share of imported intermediate inputs in total inputs used for each country across all manufacturing sectors. The vertical axis shows the degree to which imported inputs are sourced from few countries only, which causes a problem in case exactly those countries impose workplace closures. It is measured by the employment-weighted average Herfindahl concentration index of imported intermediate inputs from source countries. See Annex 1 for details.

▶ Moving forward

The demand and supply disruptions, caused by the COVID-19 crisis, propagate across borders through global supply chains. The unprecedented scale of this crisis calls for **continued large-scale support for enterprises and workers around the world, in line with the four pillars of the ILO's COVID-19 Policy Framework, guided by social dialogue and based on international labour standards** (figure 9).

As global consumer demand is down, **international coordination on stimulus packages** and **measures to strengthen income levels and consumer confidence** are key to support jobs in manufacturing supply chains.

This includes the adoption of **appropriate safety and health measures** at retail shops, production places and other businesses, as they reopen in many countries. Such measures protect both workers and consumers, which can contribute to increased consumer demand. **Increased testing and tracing of COVID-19 cases** can equally play a role in building up consumer confidence, in order to stimulate demand (ILO, 2020f). All these measures can also help to minimize disruptions of operations at workplaces, and hence contribute to a less disrupted supply of inputs into production across borders.

In line with the recommendations of the 3rd ILO *Monitor on COVID-19 and the world of work* (ILO, 2020g), **measures to support enterprises, including SMEs**, and **measures to support incomes of workers** are critical to reduce the negative impact of supply chain disruptions. In a globalized context, such measures adopted in one country, can lead to less disruption and less adverse impacts in other countries.

The crisis has revealed that the reliance on suppliers in only one or few partner countries can lead to serious supply chain disruptions. Some enterprises are likely to re-think their supply chains, with a view to increase their resilience in times of crisis.[11] **Social dialogue is key** to find solutions that contribute to achieving decent work in global supply chains and pave the path for a sustainable and inclusive recovery from this crisis.[12]

▶ **Figure 9. Policy framework: Four key pillars to fight COVID-19 based on international labour standards**

Pillar 1
Stimulating the economy and employment

▶ Active fiscal policy
▶ Accommodative monetary policy
▶ Lending and financial support to specific sectors, including the health sector

Pillar 2
Supporting enterprises, jobs and incomes

▶ Extend social protection for all
▶ Implement employment retention measures
▶ Provide financial/tax and other relief for enterprises

Pillar 3
Protecting workers in the workplace

▶ Strengthen OSH measures
▶ Adapt work arrangements (e.g. teleworking)
▶ Prevent discrimination and exclusion
▶ Provide health access for all
▶ Expand access to paid leave

Pillar 4
Relying on social dialogue for solutions

▶ Strengthen the capacity and resilience of employers' and workers' organizations
▶ Strengthen the capacity of governments
▶ Strengthen social dialogue, collective bargaining and labour relations institutions and processes

Source: ILO, 2020f.

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[11] The results of a recent survey conducted among major Japanese enterprises in May 2020, showed that 72 per cent of surveyed enterprises reported a need to revise their supply chains. 65.3 per cent of enterprises indicated the ability to switch sources with greater flexibility in case of a crisis as a reason, 57 per cent intend to stop purchasing from a single country in order to diversify sources. See Nikkei Asian Review (2020).

[12] See also the ILO *Report for discussion at the technical meeting on achieving decent work in global supply chains* (ILO, 2020h).

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▶ Annex 1: Methodology

The ILO estimated to what extent global supply chains propagate adverse demand and supply shocks on jobs related to manufacturing production across borders. More specifically, the analysis presented in this brief considers:

- Consumer demand disruption due to declines in retail activity.

- Imported input supply disruption due to workplace closures;

The estimates are based on data for 64 countries covered by the latest OECD's inter-country input output (ICIO) tables, Rev. 4, published in December 2018. These countries are: the 37 OECD member states, Argentina, Brazil, Brunei Darussalam, Bulgaria, Cambodia, China (People's Republic of), Costa Rica, Croatia, Cyprus, India, Indonesia, Hong Kong (China), Kazakhstan, Malaysia, Malta, Morocco, Peru, Philippines, Romania, Russian Federation, Saudi Arabia, Singapore, South Africa, Taiwan (China), Thailand, Tunisia and Viet Nam.

The 64 countries represent 74 per cent of the global labour force. In the Americas, Asia and the Pacific and Europe and Central Asia, the share of the labour force that is covered reaches 85-87 per cent. However, for Africa and Arab States, the share that is covered accounts for less than 10 per cent of the total labour force, as estimates for only four countries from this region are available (table A1).

▶ **Table A1. Labour force covered by estimates (per cent)**

	World	Africa and Arab States	Americas	Asia and the Pacific	Europe and Central Asia
Share in total labour force covered (per cent)	74.4	9.8	85.7	86.9	85.1
Labour force covered (millions)	2591	54	429	1729	379

Input-output modelling is applied to the OECD's ICIO tables to estimate the supply relationships related to the final demand for manufactured goods and to the demand for imported intermediate inputs entering the production of each manufacturing sector. The ILO's sectoral employment estimates relate these linkages to employment.

Disruption of consumer demand

We classify the consumer demand for products produced in the different manufacturing sectors as being at high, medium or low risk of seeing their demand collapse in consequence to the COVID-19 crisis, dependent on the country of consumer demand and the stringency of lockdown measures imposed therein. Based on this classification, we then estimate the number of jobs in manufacturing supply chains that are at high, medium or low risk. The methodology involves three steps. First, we determine the risk classification of countries, dependent on the levels of stringency of lockdown measures imposed. Second, we determine the risk classification for the different manufacturing sectors, dependent on the lockdown measures imposed. Third, we estimate the number of jobs that are sustained by the consumer demand that is respectively at high, medium and low risk of experiencing a decrease as result of the COVID-19 crisis.

In the first step, we use monthly, country-level data on retail sales growth[13] for 50 countries, which is an indicator that is directly linked to the demand for manufacturing products. We determine those two break points in the average monthly stringency index (taken from the Oxford COVID-19 Government Response Tracker database) that maximize the difference in average retail sales growth between countries with different levels of stringency. We obtain a lower threshold of 20, and an upper threshold of 73. This allows us to classify countries as countries with lockdown measures of high, medium or low stringency in place.

▶ **Table A2. Risk assessment**

Sector name	ISIC Rev. 4 Division	Impact in countries, by stringency of lockdown measures		
		High stringency (index > 73)	Medium stringency (20 > index ≥ 73)	Low stringency (index ≤ 20)
Food and beverages	10-12	Low	Low	Low
Textiles and garments	13-15	High	High	Low
Wood products	16	High	High	Low
Paper and printing	17-18	High	High	Low
Coke and refined petroleum products	19	High	High	Low
Chemicals and pharmaceuticals	20-21	Medium	Low	Low
Rubber and plastics	22	Medium	Medium	Low
Other non-metallic minerals	23	High	High	Low
Basic metals	24	High	High	Low
Fabricated metals	25	High	High	Low
Electronics	26	High	Medium	Low
Electrical equipment	27	High*	Medium*	Low
Machinery and equipment	28	High	Medium	Low
Motor vehicles	29	High	High	Low
Other transport equipment	30	High	High	Low
Other manufacturing	31-33	High	High	Low

Note: The table shows the risk of a sector to suffer a severe loss of final demand, depending on whether that final demand is located in a country with lockdown measures of high, medium or low stringency. "index" refers to the index measuring the stringency of lockdown measures, available from the Oxford COVID-19 government response tracker database. The 16 sectors correspond to the manufacturing sectors defined in the OECD's inter-country input output tables. For the sector of electrical equipment (27), no index stock return data was available and the same risk classification as for electronics (26) is applied.

In the second step, the analysis investigates the relative return of stock price indices since the time that the COVID-19 crisis started to unfold.[14] By evaluating the performance of sectoral indices from 41 countries, including both advanced and developing economies, industries can be classified as having a low, medium or high risk of facing a fall in their demand, depending on the stringency of lockdown measures imposed in countries. To capture this, we estimate whether stock index returns for particular manufacturing sectors differ, dependent on whether consumer demand is based in countries with more or less stringent measures.

To do this, a weighted stringency index is constructed for each country and sector, which takes into account the average stringency of measures imposed in April in the respective final consumer demand destinations, using the supply chain analysis of inter-country input-output tables. We identify the threshold of stringency that produces the largest estimated and statistically significant difference between sectoral stock market returns, depending on whether there are on average more or less stringent lockdown measures in place in the final consumer demand destination. The outcome is a

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[13] We obtain the data from Tradingeconomics.

[14] The data are downloaded from www.tradingview.com, and the 3-month returns for the period from 17 January to 16 April 2020 are being used.

table of average stock market returns by sector, depending on whether they face more or less stringent measures. The table is used to assess whether industries face a low (less than 12 per cent drop in stock price), medium (more than 12 per cent drop in stock price) or high (more than 16.5 per cent drop in stock price) risk of seeing demand falter.

Table A2 shows the overall risk assessment, which combines the risk classification of countries from the first step with the risk classification of sectors in the second step. The number of jobs linked to final demand of manufacturing goods is then estimated separately for demand that is of low, medium and high risk of faltering. The OECD inter-country input-output (ICIO) tables serve as a basis for the input-output model that links inputs to final demand (see for instance Timmer et al, 2014). This method allows us to see what share in a sector's gross output is linked to final demand in any country or sector. We combine the ICIO tables with the ILO estimates of employment by detailed sector classification to translate gross output embedded in manufacturing supply chains into employment. This analysis is repeated for female employment.

Disruption of imported input supply

The first step estimates for each sector within each country, the value added of the imported intermediate inputs from each country, taking into account the entire supply chain. This allows us to determine the share of those imported inputs that are sourced from countries with closures of all but essential workplaces in place. Using employment as weight, the individual shares are aggregated to an overall indicator of the degree of imported input supply disruption. Employment weighting achieves best the objective to evaluate the severity of the input supply disruptions for workers at the aggregate.

The general vulnerability to imported input supply disruptions is represented in two dimensions. The concentration of imported inputs is computed using a Herfindahl index of value added embedded in the intermediate inputs, measuring the concentration of input supply over different source countries. The share of imported intermediate inputs in total intermediate inputs within a sector is directly derived from the OECD ICIO tables. The aggregates across countries or sectors presented in the note use the sectoral employment as weights.

▶ Annex 2: Data

▶ **Table A3. More details on jobs in other manufacturing supply chains**

	Share of supply chain jobs in total employ-ment (per cent)	Jobs sustained by consumer demand in different countries, by level of stringency of lockdown measures in place (millions)		Total jobs at high risk due to drop in consumer demand (millions)	Share of female jobs in supply chain jobs (per cent)
		High stringency	Medium stringency		
For information on jobs in *food and beverages* supply chains, *textiles and garments* supply chains, *motor vehicles* supply chains, *machinery and equipment* supply chains, *electronics* supply chains, *chemicals and pharmaceuticals* supply chains and *electrical equipment* supply chains, please see table 1.					
Other manufacturing supply chains	**4.3**	**52**	**54**	**99**	**32.5**
Other manufacturing, repair and installation supply chains	2.0	22	26	48	32.3
Other transport equipment supply chains	0.8	9	9	19	34.8
Fabricated metal supply chains	0.5	7	5	12	27.4
Rubber and plastics supply chains	0.3	3	4	0	33.7
Coke and refined petroleum supply chains	0.3	3	4	7	32.6
Wood supply chains	0.2	3	2	4	34.9
Paper and printing supply chains	0.2	2	3	5	35.9
Other non-metallic mineral supply chains	0.1	1	2	3	30.9
Basic metals supply chains	0.1	1	1	2	30.3
All manufacturing supply chains	**25**	**376**	**239**	**292**	**38.1**

Note: This table is an extension of table 1, showing more disaggregate information on jobs in "other manufacturing suppky chains". Estimates are based on data for 64 countries that account for 74 per cent of the global labour force. Red cell indicates workers at high risk. Yellow cell indicates workers at medium risk. Yellow-red striped cell indicates workers at high or medium risk. See Annex 1 for details.

▶ **Table A4. Jobs in manufacturing supply chains, world and by region, by level of risk to be affected by the collapse in demand**

Region	Risk	Jobs in manu-facturing supply chains (millions)	% in total employ-ment	Female jobs (millions)	% in female employ-ment	Jobs in manu-facturing or other industry (millions)	Jobs in services (millions)	Jobs in agri-culture (millions)
World (64 countries)	High	292	11.9	113	11.8	167	96	29
	Medium	63	2.6	26	2.7	31	25	6
	Low	260	10.6	96	10.0	62	50	148
Americas	High	35	8.8	13	7.3	21	13	1
	Medium	7	1.7	2	1.4	3	3	0
	Low	31	7.8	10	5.8	9	11	12
Africa and Arab States*	High	3	7.8	1	6.8	2	1	0
	Medium	1	1.3	0	1.0	0	0	0
	Low	3	6.8	1	7.4	1	1	1
Asia and the Pacific	High	219	13.2	87	14.3	122	69	27
	Medium	46	2.8	20	3.2	22	18	6
	Low	203	12.3	75	12.3	43	30	130
Europe and Central Asia	High	35	9.8	12	7.6	22	13	1
	Medium	10	2.7	3	2.0	6	4	0
	Low	23	6.4	9	5.9	9	8	5

Note: Estimates are based on data for 64 countries that account for 74 per cent of the global labour force. For Africa and Arab States, the data is based on information for four countries only and hence not representative. See Annex 1 for details.

▶ **Table A5. Jobs in manufacturing sectors, world and by region, by level of vulnerability to be affected by imported input supply disruptions**

Sector	Vulnera-bility	Share of foreign in total inputs (%)	Herfin-dahl index	Number of jobs in sector				
				Total	Ameri-cas	Africa and Arab States*	Asia and the Pacific	Europe and Central Asia
Electronics	High	28.0	0.13	25	1.2	0.1	22	2.1
Motor vehicles	High	23.7	0.12	16	4.2	0.2	7	4.1
Other transport equipment	High	22.0	0.15	7	1.2	0.1	4	1.2
Coke and refined petroleum products	High	31.5	0.22	2	0.4	0.0	1	0.3
Textiles, apparel	Medium	14.3	0.14	63	6.5	0.7	51	4.6
Other manufacturing, repair	Medium	16.7	0.09	41	5.1	0.6	30	5.3
Fabricated metal	Medium	18.6	0.09	25	3.5	0.4	16	4.8
Machinery, equipment	Medium	18.8	0.10	19	3.1	0.1	12	4.0
Chemicals, pharmaceuticals	Medium	16.0	0.08	19	2.6	0.3	13	2.9
Basic metals	Medium	14.9	0.10	14	0.7	0.1	10	3.1
Rubber, plastics	Medium	18.6	0.09	13	1.4	0.1	10	2.3
Electrical equipment	Medium	19.8	0.09	13	1.3	0.1	10	1.8
Food products, beverages, tobacco	Low	6.7	0.10	66	7.8	1.1	49	7.9
Other non-metal	Low	12.1	0.08	19	2.2	0.2	15	2.1
Wood products	Low	9.9	0.08	18	1.1	0.2	15	1.6
Paper, printing	Low	12.8	0.09	14	1.9	0.2	10	2.0

Note: Estimates are based on data for 64 countries that account for 74 per cent of the global labour force. For Africa and Arab States, the data is based on information for four countries only and hence not representative. See Annex 1 for details.

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