



# Staff memo

## Restrained foreign trade after 2009: discussion of possible consequences for Sweden

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A staff memo provides members of the Riksbank's staff with the opportunity to publish slightly longer, advanced analyses of relevant issues. It is a publication for civil servants that is free of policy conclusions and individual standpoints on current policy issues. A staff memo is approved by the author's Head of Department. This staff memo has been produced by staff at the Riksbank's Monetary Policy Department.

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## Summary

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Global trade has increased rapidly since the early 1990s, thanks to technological developments and increasingly liberal trade regulations. But after the great recession in 2008–2009, we have begun to see signs that the trends characterising the 1990s and 2000s have come to a halt. It is still too early to tell how the current pandemic can affect Swedish firms' participation in global value chains, but it is probable that many firms will review their current structure.<sup>2</sup>

In this Staff Memo, I discuss, on a general level, how the Swedish economy has been affected by the increase in foreign trade between 1990 and 2008, and primarily by Swedish participation in global value chains. Moreover, I analyse how developments following the financial crisis can affect different parts of the Swedish economy.

The analysis shows that Swedish productivity growth could be either lower or higher, depending on whether reduced Swedish participation in global value chains is primarily due to increased trade barriers or to technological advances. It also shows that export growth can become more sensitive to exchange rate fluctuations, at the same time as export market growth will probably be lower when the global value chains become less significant.

The trends with an increasingly widespread trade in global value chains may have subdued inflationary pressures between 1990 and 2008. But since the crisis years, participation in global value chains has declined, and thus cannot be the main explanation for inflation being weak in recent years.

A slowdown in foreign trade is worrying for the Swedish economy. Households have benefited from good access to globally produced goods and services of high quality and at low prices. Companies have been able to expand their operations thanks to increased demand from abroad and they have benefited from the specialisation of work tasks in the global value chains. A return to a global economy that is less open would probably entail major changes and negative effects for welfare, for both Swedes and our neighbours.

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<sup>2</sup> This staff memo was written before the Corona pandemic broke out. Therefore, the analysis does not fully incorporate all the events over the past few months.

# The trend towards increased foreign trade appears to have been broken

Since the 1990s, global trade has increased at a fast pace. Technological advances and increasingly liberal trade regulations have meant that companies have been able to develop new methods of production and that private individuals have gained access to new goods, services and cultures.<sup>3</sup> At the same time, in global terms, this development has lifted several million people out of poverty. The Great Recession of 2008–2009 was followed by the largest decline in global trade in modern history, and both global and Swedish foreign trade have since slowed down: exports and imports as a percentage of GDP have remained relatively unchanged, incoming and outgoing foreign direct investments are lower than prior to the crisis and trade in intermediate inputs and services in global value chains has fallen.

## What is a global value chain?

A value chain is a corporate network of developers, producers, sub-contractors, investors and distributors who all supply inputs in one step or more of a production process. They may use imported intermediate goods to create goods or services for final consumption or they may supply intermediate goods or services for processing. One company may find itself involved in several different stages of the same network at the same time (for example as developer, investor and distributor). Value chains become international when intermediate goods or services cross one or more international borders. Examples of Swedish companies involved in global value chains are IKEA and Ericsson, who organise networks of sub-contractors and partners across the entire world to assemble their products. Other major Swedish companies like SKF contribute intermediate goods at an early stage in the production process in long value chains. Value chains arise when Swedish companies decide to move operations overseas to their own branches, via direct investments, or contract operations to other companies abroad. But they also arise when foreign multinational companies establish operations in Sweden. The driving force behind this expansion is the pursuit of the efficiency that can be achieved by allowing different specialists in different places to manage different parts of the production processes.

The earlier trends towards increased foreign trade appear to have been broken, at the same time as protectionism around the world has increased. Today, foreign trade is often framed as a zero sum game, where countries compete against one another, which is in contrast to one of the basic principles of economics: that trade exchanges usually benefit both parties.<sup>4</sup> In today's tightly interwoven global economy, complexity has undoubtedly increased and modern trade theory puts a greater emphasis than before on economies of scale and network effects when evaluating the effects of trade.<sup>5</sup> However, recent research does not contradict the fact that trade entails benefits for both partners. On the contrary, it reinforces the picture that foreign trade is a global collaboration, rather than a competition between nations.

Of course, increased foreign trade does not have positive consequences in each individual case. People can lose their jobs when production moves abroad and domestic companies can go bankrupt as a result of competition from imports.<sup>6</sup> However, the point is that foreign trade improves the situation for citizens as a whole, even if deteriorations can be clear to individual workers or companies in particular sectors. For Sweden, developments over the past ten years, with more trade discrimination measures, less trade in value chains and increased protectionism, have been particularly worrying as we are so strongly dependent on other countries, both for companies' production and household consumption.

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<sup>3</sup> This Staff Memo analyses foreign trade in goods and services. Other aspects that are closely linked to globalisation, but are not discussed although they are nevertheless important, are financial markets and migration. For an overview of how immigration can affect the Swedish labour market and the economy as a whole, see Olli Segendorf and Theobald (2019).

<sup>4</sup> For a description of the basic principle in economics, see Mankiw (2007).

<sup>5</sup> See Melitz (2003).

<sup>6</sup> For instance, Autor et al. (2016) study how the labour market within the manufacturing industry in the United States has been affected as a result of import competition from China.

In this Staff Memo, I first take a brief look back at developments in foreign trade in Sweden since the early 1800s, and then focus on developments since the Great Recession of 2008–2009. I analyse the potential effects of the weaker foreign trade, and more specifically the development of global value chains. The analysis also includes the effects on various variables in the Swedish economy, such as productivity growth, exports and the correlation between inflation and domestic resource utilisation.

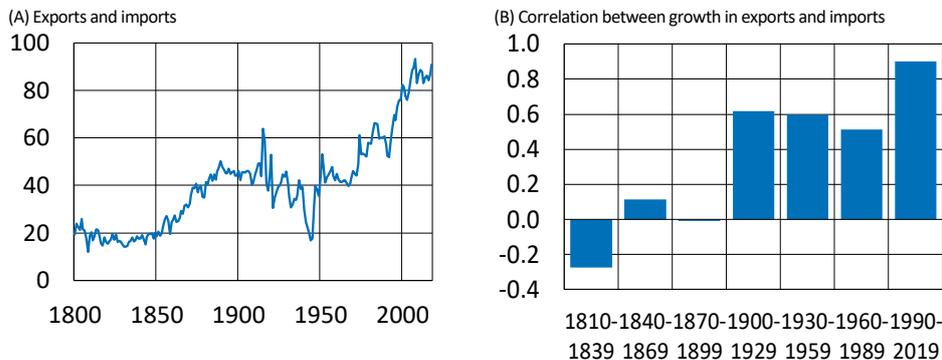
## Developments in foreign trade since the 1800s

Sweden, like the rest of the world, has gone through several phases of economic globalisation since the Industrial Revolution of the 19th Century. The world order of the time, with relatively closed nations, was gradually replaced by an open and global economy. Figure 1A shows how Swedish foreign trade rose only moderately during the first half of the 1800s.<sup>7</sup> But when transport and communication costs fell, it became possible for Swedish companies to export an increasing number of products, primarily forest, iron ore and grain.<sup>8</sup> Imports of capital goods increased at the same time, and developments up to the early 1900s benefited from increasingly liberal trade regulations in major economies such as the United Kingdom, Germany and the rest of Europe, and increased capital movement and better financial integration.<sup>9</sup>

But the beginning of the 1900s was a turbulent period, with the First World War, the global depression and the Second World War. During this period the relative free trade, which had become established during the second half of the 1800s, was replaced with substantial trade barriers, and Swedish foreign trade shrank as a percentage of GDP. After the Second World War, there was a new order. Freer trade and economic growth went hand in hand, at the same time as international institutions such as the IMF, the World Bank and the United Nations took on more prominent roles. From the mid-1960s, foreign trade rose rapidly, despite falling back during the oil crisis of 1973–1974, during the Swedish financial crisis of the early 1990s and the Great Recession of 2008–2009.

**Diagram 1. Swedish foreign trade since the 1800s**

(A) as a percentage of GDP, per cent. (B) correlation coefficient



Sources: Edvinsson et al. (2014) and Statistics Sweden.

Note: The correlation coefficient for 1990–2019 in (B) is also high, 0.82, if the fall in exports and imports in 2009 and the recovery in 2010 are excluded.

### Swedish companies have always participated in value chains of some kind

During the 19th Century, companies in Sweden mainly imported intermediate inputs, both raw materials and capital goods, to produce goods for Swedish consumption, with only a smaller part of output being exported on to other countries.<sup>10</sup>

<sup>7</sup> The historical time series for Swedish trade and GDP come from historical monetary statistics for Sweden available from Sveriges Riksbank website.

<sup>8</sup> See Statistics Sweden (1972).

<sup>9</sup> See, for example, Rajan and Zingales (2003).

<sup>10</sup> This is also the case for the world as a whole. See Baldwin (2016), among others, for a detailed discussion of how globalisation has changed in several stages since the 18th Century.

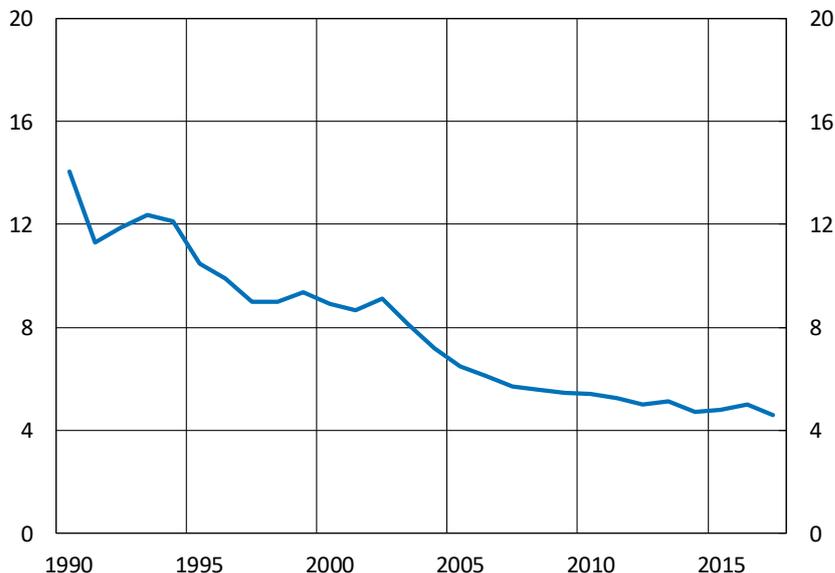
One way of illustrating this over a longer period is to calculate the correlation between growth in exports and imports. Put simply, if the import content in Swedish exports is higher, growth in exports and imports will be more correlated, as imported intermediate inputs are being used to produce the exports. Figure 1B shows that the correlation between export and import growth was either negative or close to zero between 1810–1899. From the start of the 20th Century, the correlation increased, reaching around 0.5–0.6 before 1990. From the 1990s until the present day, the correlation has been significantly higher, just over 0.9. The development has thus been in progress over the last hundred years that has accelerated significantly in recent decades.

## Technological advances and liberal trade regulations drove foreign trade

The last thirty years have been special in many respects. On the world stage, the General Agreement of Trade and Tariffs (GATT) was succeeded by the World Trade Organisation (WTO), following the so-called Uruguay Round. After the fall of the Berlin Wall, countries that had previously been part of the Soviet Union gradually opened up for foreign trade. China also took steps towards freer trade in the mid-1980s and continued this trend in the 1990s and 2000s, becoming a member of the WTO in 2001. Since then, China's share of world trade has risen rapidly.<sup>11</sup> In Europe, the European Community (EC) developed into the European Union (EU) in 1993, which was a continuation of decades of ever-closer cooperation between the countries of Europe. The EU created the largest free trade area in the world. Sweden joined the Union in 1994 but chose, in a referendum in 2003, to wait to join the Economic and Monetary Union (EMU) that now consists of 19 EU Member States. Due to the broad liberalisation of foreign trade, average global tariff levels have shown a falling trend; see Figure 2.

**Diagram 2. Average global tariff level**

Per cent.



Source: World Bank, WITS.

Note: Import-weighted average of applied tariff rates.

### Rapid Swedish expansion in global value chains

During the 1990s, both Swedish and global foreign trade increased rapidly; see Figure 3A. Personal computers had become increasingly common among private persons and, by the mid-1990s, the Internet had become increasingly widespread. The new communication technologies and lower

<sup>11</sup> According to the OECD, China's share of world trade rose from around 3 per cent in 2001 to around 11 per cent in 2018.

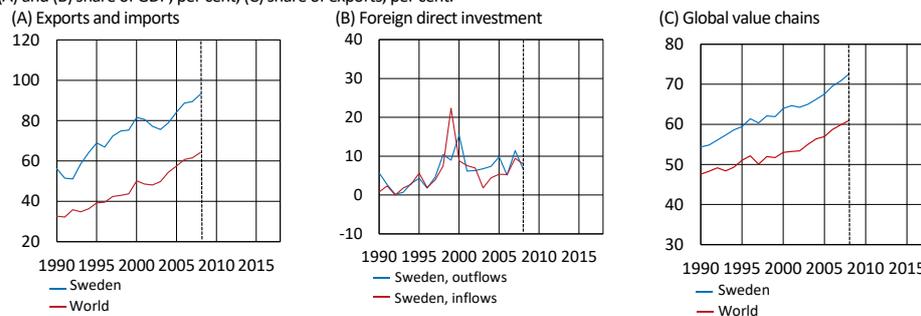
transport costs, combined with trade reforms, made it possible to split up production processes and Swedish companies started to participate in global value chains increasingly often.

Outward foreign direct investment from Sweden rose, meaning that major Swedish companies became established abroad; see Figure 3B. Manual and routine-based working tasks were moved abroad, including to emerging market economies, while more advanced working tasks with high shares of value added were largely kept at workplaces and main offices in Sweden. The outsourcing of certain types of working tasks and some production transformed demand for skills and labour in Sweden and enabled rapid productivity growth in the Swedish business sector.<sup>12</sup> Foreign multinational corporations also became established in Sweden. Direct investment in Sweden by foreign companies has thus probably had positive effects on wages and employment in the Swedish acquired companies.<sup>13</sup>

Intermediate inputs and services started to cross national borders several times and Swedish exports thereby became increasingly involved in global value chains. Figure 3C shows that development proceeded quickly: from 1990–2008, Swedish trade in value chains rose from 54 per cent of exports to 73 per cent, which was faster than for the world as a whole, where the increase was from 48 to 61 per cent of global exports.<sup>14</sup>

**Diagram 3. Foreign trade indicators 1990–2008**

(A) and (B) share of GDP, per cent, (C) share of exports, per cent.



Sources: Statistics Sweden, World Bank and UNCTAD-Eora.

Note: If the foreign or Swedish owners hold more than 10 per cent of the shares' voting rights, this is classed as foreign direct investment in (B). Global value chains are foreign value-added in Swedish exports and Swedish value-added that is used by other countries to produce exports. The broken line represents the year 2008.

## Weak development after collapse of world trade

In 2008, it started to become clear that economic growth in the world was faltering. Following the bankruptcy of Lehman Brothers in September, a downward spiral started in global economic activity, which later came to be known as the Great Recession. Between 2008 and 2009, GDP in Sweden fell by 4.2 per cent, and exports and imports significantly more, around 14 per cent. As a proportion of GDP, Swedish trade fell by 10 percentage points between 2008 and 2009, which was slightly more than for world trade, which fell by around 8 percentage points; see Figure 4A. The fall was the deepest since the Second World War and has come to be known as the Great Trade Collapse.<sup>15</sup>

Since then, foreign trade as a percentage of GDP has remained more or less stable, both in Sweden and abroad.<sup>16</sup> Since 2008, Swedish foreign direct investment, both incoming and outgoing, has been

<sup>12</sup> See Swedish Agency for Growth Policy Analysis (2016).

<sup>13</sup> See Swedish Agency for Growth Policy Analysis (2017).

<sup>14</sup> The exact percentage of trade in global value chains is uncertain. Different sources give different percentages. But what several sources, such as the World Input-Output Tables produced by Timmer et al. (2016) and the OECD's Trade in Value Added, is that the trend has been upward since the mid-1990s, with a peak in 2008. After this, participation in value chains has decreased according to all measures.

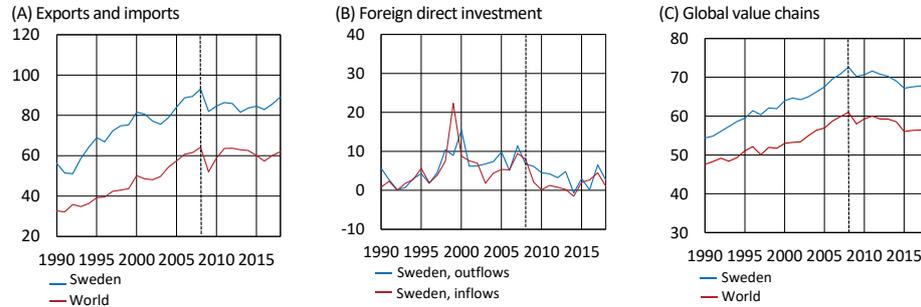
<sup>15</sup> See Baldwin (2009) for a detailed analysis of the fall in world trade during the crisis years.

<sup>16</sup> In Sweden, the ratio is still below the level that prevailed in 2008, even if it has risen slightly in recent years.

less than during the first decade of the 21st Century; see Figure 4B. Trade has also decreased in global value chains; see Figure 4C.<sup>17</sup>

**Diagram 4. Foreign trade indicators 1990–2018**

(A) and (B) share of GDP, per cent, (C) share of exports, per cent.



Sources: Statistics Sweden, World Bank and UNCTAD-Eora.

Note: If the foreign or Swedish owners hold more than 10 per cent of the shares' voting rights, this is classed as foreign direct investment in (B). Global value chains are foreign value-added in Swedish exports and Swedish value-added that is used by other countries to produce exports. The broken line represents the year 2008.

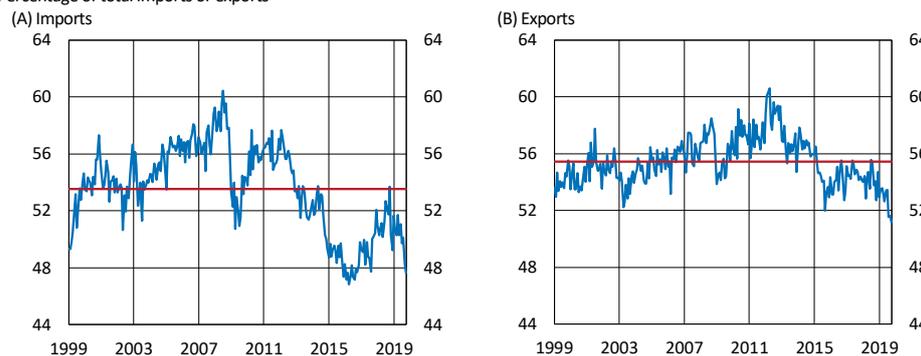
### Monthly trade in goods data gives a similar view to global input-output tables

Indicators showing participation in global value chains, as in Figures 3C and 4C, are often measured using global input-output tables compiled using national input-output tables and trade data. Input-output tables describe the consumption of intermediate inputs and production for final use as consumption, exports or investment and can be used to describe the interaction of various sectors. It requires a great deal of manual processing and assumptions to create the global input-output tables and it takes several years before new outcomes become available. Alternative indicators based on goods trade data can also be used if a more current view of developments is desired. One example is trade in intermediate inputs as compiled by Eurostat; see Figures 5A and 5B.

The trade in intermediate inputs gives the same qualitative view as the global input-output tables.<sup>18</sup> Swedish imports of intermediate inputs peaked in 2008 and have subsequently fallen below a mean value calculated from 1999–2019 (see Figure 5A). Exports of intermediate inputs increased until mid-2012, after which they showed a falling trend (see Figure 5B).

**Diagram 5. Swedish foreign trade with intermediate inputs**

Percentage of total imports or exports



Source: Eurostat

Note: The broken red line is the average for the period 1999–2019. The same view is obtained if raw materials (for example exports and imports of oil, steel or wood products) are excluded.

From the end of 2016, trade in intermediate inputs rose in tandem with the recovery of the global economy, before falling back slightly from the end of 2018, which may be connected with the

<sup>17</sup> Different databases of trade in global value chains give slightly different views. Data concerning import content from the OECD's TIVA shows the greatest decline since 2008, the UN Conference on Trade and Development (UNCTAD) database EORA shows the second greatest and World Input-Output Tables the lowest. However, regardless of the source, the same qualitative view of falling import content is given.

<sup>18</sup> The difference between goods trade statistics and indicators of global value chains may be connected with the different data sources used and the fact that the global value chains also include trade in services.

escalating trade conflict between the United States and China and the general unease over the conditions for the future of world trade.

## Several explanations for the weaker development

There are several explanations for the fact that global trade is no longer increasing faster than global GDP and different analysts place different emphasis on different factors. One explanation is that emerging market economies gradually became an increasingly important part of the global economy in the 2000s and 2010s. When demand from emerging market economies increases, imports generally increase to a lesser extent than they do for advanced economies. Demand has also changed within countries. For example, large countries such as China have started to switch from an investment-driven economy to a more consumption-based model. Overall, the import content is significantly higher in investment goods than it is in consumer goods, which can lead to imports increasing less when GDP rises.

Among others, IMF (2016) attaches great weight to these factors and ascribes around three-quarters of the decline in world trade relative to GDP after the crisis to changes in demand, a shift from investment to consumption and changes in the composition of countries in world trade. ECB (2016) considers that shifting demand and the changed composition of world trade are responsible for around 60 per cent of the downturn, while OECD (2016) attaches significantly greater weight to other, more structural factors such as lessened trade in global value chains and less liberal trading regulations, particularly in the years 2011–2015.<sup>19</sup>

### Slower development of global value chains

Trade in intermediate inputs and services in global value chains increases global trade in a purely statistical sense as the included components are counted several times in the foreign trade of several countries.<sup>20</sup> If trade in these value chains decreases, foreign trade thereby slows down. One conceivable reason for the lower value chain participation after the crisis is that a number of trade-restrictive measures have been adopted. Export subsidies, demands for local content in production, delayed customs procedures and other trade-restrictive measures are not visible in customs statistics but can nevertheless restrain foreign trade and, above all, trade in global value chains.<sup>21</sup> In addition, increased uncertainty over the future development of trade may make it less attractive to expand value chains.<sup>22</sup> The trade conflict between the United States and China in 2017–2019 is one such example that has caused uncertainty, which can be seen in a text-based measure of world trade uncertainty.<sup>23</sup> Higher uncertainty may have contributed to the lower trade in intermediate inputs, particularly in recent years. But it cannot explain the weak development of global value chains since the financial crisis. It could, of course, be the case that something as complex as uncertainty is difficult to capture in one measure and that uncertainty overall has still been higher after the financial crisis than before.

### The Corona pandemic could prompt firms to review the structure of their supply-chains

Uncertainty has however increased over the past few months due to the spread of the coronavirus. The spread of the virus, and supply chain disruptions stemming from cancelled deliveries, could make companies rethink their global supply chains. Although these deliberations are not yet available in conventional statistics, they could become a significant factor going forward. In the Riksbank's telephone interviews conducted during March and April, it is clear that the pandemic has led to

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<sup>19</sup> See, for example, ECB IRC Trade Task Force (2016), OECD (2016) and IMF (2016).

<sup>20</sup> See Koopman et al. (2014) for details on how trade flows are counted double and what action can be taken to adjust for double-counted trade flows, thereby measuring exported value-added instead of gross exports.

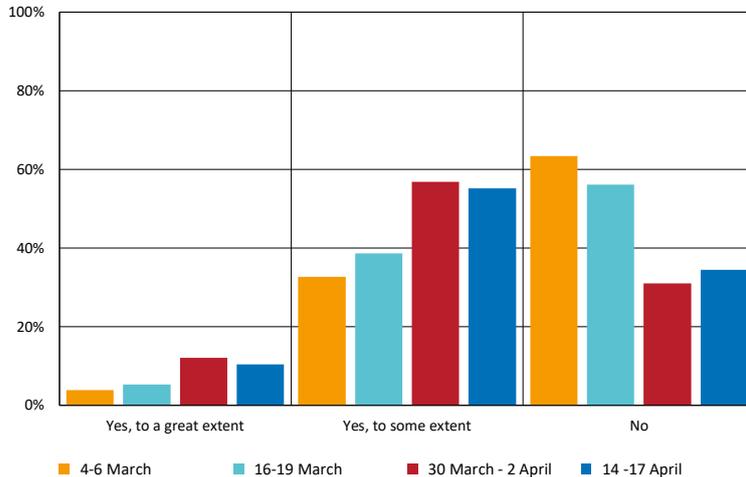
<sup>21</sup> See OECD (2016) or Evenett and Fritz (2019).

<sup>22</sup> See IMF (2016).

<sup>23</sup> See Ahir et al. (2018).

disruptions in production and deliveries, see Figure 6.<sup>24</sup> In the National Institute of Economic Research's Economic Tendency Survey and Swedbank/Silf's purchasing manager index many firms confirm that disruptions to deliveries are the most important, or an important, reason as to why production has decreased.<sup>25</sup>

**Diagram 6. Has the outbreak of the coronavirus led to disruptions in production or deliveries to Sweden?**  
Share of total responses, percent.



Source: Sveriges Riksbank.

### Technological advances may have reduced the need for trade in global value chains

Trade barriers and uncertainty can lead to work tasks and production being returned to Sweden. But there may also be other reasons for this. When the cost of automated solutions falls, it may become relatively cheaper to produce in Sweden and Swedish production will then become more competitive against the rest of the world.<sup>26</sup> The current digitalisation is an important part of this.

When it also becomes possible to automate working tasks requiring higher competence, there may be good reason to bring these back from abroad and expand production in Sweden. This could certainly hamper outgoing foreign direct investments and trade in global value chains. However, compared with trade barriers that reduce foreign trade, such a development, driven by technological advances, is not necessarily something negative. Among other things, Baldwin and Forslid (2020) discuss the future of world trade when large parts of the manufacturing sector are robotised. In a shift like this, it is less important where goods are manufactured, and increased digitalisation and automation could thereby lead to exports in global value chains being replaced by exports of finished goods from Sweden.<sup>27</sup> At the same time, further digitisation could enable firms to expand global value chains more rapidly as more tasks can be performed in different locations. This would increase the need for global value chains (see World Bank, 2020).

### Analysis of changing import content in Swedish exports

When Swedish companies participate in global value chains, it is often because they are importing intermediate inputs and services to produce their exports. According to the database Trade in Value Added from the OECD, which contains detailed data over industries and trading partners, the import content of Swedish exports fell by just over 6 per cent between 2008 and 2015; see Figure 7. This could be due to composition effects, which is to say changing exports of various goods and services as well as export destinations, or to falling import contents in given goods or services to export

<sup>24</sup> Sveriges Riksbank (2020)

<sup>25</sup> National Institute of Economic Research (2020) and Swedbank (2020).

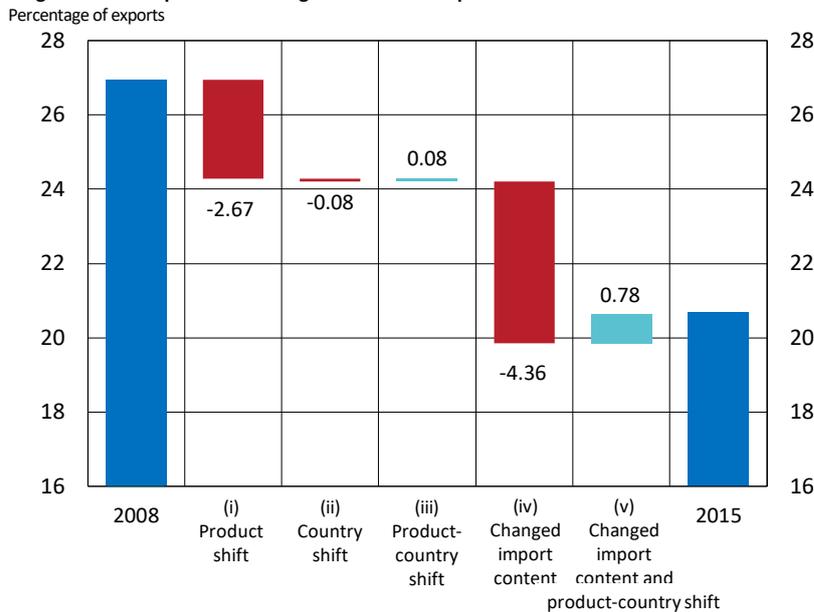
<sup>26</sup> See Huidrom et al. (2019) for a description of how automation can replace trade in value chains.

<sup>27</sup> Donnan and Leatherby (2019) argue that globalisation instead develops because of technological advances.

destinations. If the composition effects are most important, the change does not necessarily mean that the value chains have become shorter.

A simple way of investigating how the import content of Swedish exports has changed is to make a variant of a shift-share analysis; see Appendix 1.<sup>28</sup>

**Diagram 7. Decomposition of changes in Sweden's import content**



Source: OECD TIVA (2018).

Note: 2008 and 2015 refer to the level of the import content of Swedish exports during the different years. The red bars are factors that have made a negative contribution to the import content and the light blue ones are positive contributions. (i) changed weight of different sectors in Swedish exports, (ii) changed weight of different countries in Swedish exports, (iii) changed weight of product-country combinations. (iv) changed import content in product-country combinations and (v) is a combination of changed import content and weight of product-country combinations in Swedish exports.

The analysis divides the change between 2008 and 2015 into sub-changes that can be ascribed to changes in the composition of Swedish exports, in terms of the goods and services exported (i), the countries to which they are exported (ii), or a combination of the two (iii). In concrete terms, this means that the import content of Swedish exports can decrease when sectors with relatively low import content become more important in terms of Swedish exports, when export destinations to which we send goods with generally lower import content are responsible for a greater share of exports or when product-country combinations in Swedish exports have shifted. The changes can also be due (iv) to changes in the import content on the product-country level or (v) to changes in both import content and composition. The exercise gives no direct insight into why the changes have happened. It does, however, give insights into which effects have greatest significance, for example whether the lower import content depends on composition effects or whether exports to the same product-country combinations have a lower import content.<sup>29</sup>

Around 2.7 percentage points of the reduction are due to the composition of products that Sweden exports having shifted towards products with a lower import content (i). Around 4.4 percentage points are due to Swedish sectors having a lower import content overall (iv). This lower import content thus partly seems to be due to composition effects, but is primarily a consequence of companies having reorganised their value chains since the crisis.

<sup>28</sup> A shift-share analysis separates the difference in a number of subcomponents that together can explain the change in an aggregate.

<sup>29</sup> The analysis uses sector data from the OECD's Trade in Value Added (TIVA) database, which is the most-recently updated database of value-chain participation with detailed sectoral information between 2008 and 2015.

## Consequences of less trade in value chains

For a small, open and trade-dependent economy like Sweden's, it is worrying that foreign trade and participation in global value chains has fallen compared with the period before the financial crisis. The previous expansion did not just benefit major multinational export corporations in Sweden. After all, smaller companies are often suppliers to exporters and thereby sell indirectly part of their output to other countries. In a study by Statistics Denmark and the OECD (2017), the authors find that between 30 and 50 per cent of employment in Swedish small and medium-sized enterprises depends on exports, often as supplier to major companies in Sweden. OECD (2019) shows that around one-fifth of multinational corporations' output consists of intermediate inputs and services from smaller domestic companies. Due to these links, even small domestic companies are thus affected by the economic activity of the larger companies and by the development of the global economy.

Private persons in Sweden have also benefited from increased foreign trade. According to the OECD's database Trade in Value Added, the import content of Swedish consumption is around one-fifth. Goods have become cheaper and consumers have gained access to a greater selection of higher-quality products and services, which has increased our welfare.

Welfare losses due to increased trade barriers could now become significantly greater than earlier. Cappariello et al. (2020) compare trade and welfare losses due to increased trade barriers in an equilibrium model with and without global value chains. When the model includes global production structures, the negative effects of the trade barriers become significantly more comprehensive. Returning to a less open global economy with higher tariffs and trade barriers would therefore probably entail significantly greater changes with today's tightly linked economies than previously, both for private persons and for companies.

### Higher or lower productivity?

From 1995 until the mid-2000s, productivity growth in Sweden was faster than among many OECD countries. It was during this period that Swedish companies expanded their operations in global value chains. International studies have shown just this, that imports of intermediate inputs and services raise both productivity and wages in companies.<sup>30</sup> However, since just before the crisis, productivity growth has been unusually low, both in Sweden and the rest of the world.<sup>31</sup>

Part of the decline in productivity may be connected with measurement methods that do not take sufficient account of the changes taking place in the economy as digital services become more widespread. For example, companies in the Riksbank's business survey state that productivity is good overall and that new technology has made a positive contribution to development, at the same time as compliance and IT security have restrained development. However, different companies measure productivity in different ways and the measures do not need to correspond with official statistics such as value-added per hour worked.<sup>32</sup>

Better technical solutions and competitive advantages in Sweden could reduce the import content of Swedish export production but could similarly lead to higher productivity growth. Extended trade barriers could, on the other hand, increase the cost of production abroad and cause production to move to Sweden where it is relatively less productive.

Figure 8A shows an indicator for digitalisation in Sweden, Digital Economy and Society Index (DESI), compiled by Eurostat. This summarises the development of about thirty sub-indicators that

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<sup>30</sup> See Halpern et al. (2015) and ECB Working Group on Global Value Chains (2019).

<sup>31</sup> There is disagreement over the reasons for the lower productivity growth worldwide. Some economists, such as Robert Gordon, say we are in a period of very low productivity growth that will be the new normal for a rather long time. According to this point of view, a large share of the fruits of digitalisation have already been harvested. As early as 2005, for instance, several economies had adapted their business methods and models to the internet. The conclusion of this point of view is, put simply, that more recent innovations have not been as significant as those during earlier industrial revolutions. Others, such as Andrew McAfee and Erik Brynjolfsson, say that the effects of digitalisation have passed under the radar and that we will see major productivity increases in the future when the new technologies are used more broadly in the business sector. See references in Skingsley (2019).

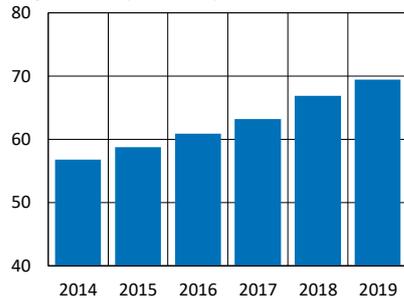
<sup>32</sup> Sveriges Riksbank (2019).

broadly show how far a country has come in digitalisation. Sweden is the top-ranked EU country and the index has increased rapidly from 2014 to 2019. At the same time, Figure 8B shows that discriminatory trade barriers globally (blue line) have become more common and that liberalising measures (red line) have increased significantly more slowly. The gap between discriminatory and liberalising measures has widened (turquoise bars) and suggests that trade barriers overall have increased.<sup>33</sup> However, it is difficult to know which of the two trends has had the greatest impact on the development of global value chains in Sweden. The common view of researchers and international organisations is that several factors have driven developments.<sup>34</sup>

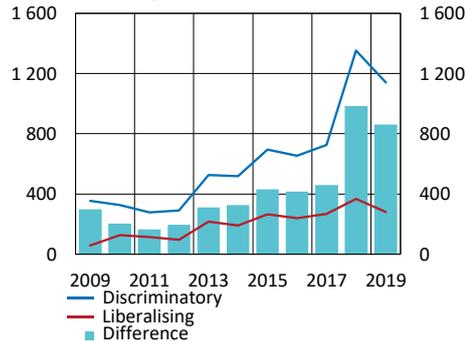
**Diagram 8. Increased digitalisation and increasing numbers of trade barriers**

(A): Index. (B): Number.

(A) Digital Economy and Society Index for Sweden



(B) Trade-influencing measures worldwide



Sources: Eurostat and Global Trade Alert.

### Stronger relationship between krona exchange rate and exports?

One consequence of Swedish companies' participation in global value chains is that the krona exchange rate has less effect on export volumes. According to the textbooks, companies' products and services become cheaper on export markets when the krona depreciates. However, if companies use imported intermediate inputs in their export production, marginal costs also rise when the krona exchange rate weakens. The higher the import content, the lower the impact the krona exchange rate has on sales prices and thus export volumes. De Soyres et al. (2018) demonstrate empirically that a higher import content leads to a weaker exchange rate effect and, for some sectors, the effect can even be the reverse: a currency depreciation leads to falling exports. For Sweden, Frohm (2018) shows that, even if the exchange rate effect is slightly weakened due to participation in global value chains, Swedish exports still increase when the exchange rate becomes weaker.<sup>35</sup>

When participation in global value chains now decreases, the krona exchange rate can thus have a greater impact on export volumes: a decreased import content means that the exchange rate effect on export prices and volumes becomes stronger. At the same time, it is common that a country's export volumes are largely determined by growth on the export markets. When global value chains become a less common element in world trade, demand for Swedish intermediate inputs and services also decreases, which can lead to growth on export markets becoming lower.<sup>36</sup> Lower participation in global value chains will therefore probably lead to lower export growth.

### Stronger relationship between resource utilisation and inflation?

Several analysts have claimed that globalisation and increased participation in value chains in particular has reduced the effect of domestic resource utilisation on inflation and that the so-called Phillips curve has become flatter.<sup>37</sup> According to this hypothesis, the increasingly globalised economy

<sup>33</sup> Trade barriers are a number of discriminatory trade measures according to Global Trade Alert, which summarises export barriers, subsidies, licenses and quotas, investment barriers or discriminatory public procurements.

<sup>34</sup> See WTO (2019) or World Bank (2020).

<sup>35</sup> See Frohm (2018).

<sup>36</sup> See ECB Working Group on global value chains (2019).

<sup>37</sup> See Borio (2017) and the Swedish Association of Industrial Employers (2018).

can increase competition and thus help restrain domestic price and wage increases, thereby contributing to lower inflation. When competition increases, employees and trade unions become less inclined to demand higher wage increases when the economic situation is good and companies find it more difficult to raise prices due to competition, and instead lower their mark-ups when costs rise.

Among others, Auer et al. (2017) demonstrate a positive correlation between international resource utilisation and domestic inflation, which additionally becomes stronger when countries participate more in global value chains. Gilchrist and Zakrajsek (2019) also study how the link between domestic resource utilisation and producer prices is affected by international trade. They show that domestic demand shocks have less effect on sectors exposed to international trade and more effect on those that are not so dependent on foreign trade. Overall, however, the empirical research shows more mixed results for how foreign trade and trade in global value chains affects the development of inflation.<sup>38</sup>

If it is nevertheless assumed that globalisation affects the relationship between resource utilisation and inflation, the restraining effect was probably greatest up until the end of 2008. Since then, Swedish trade as a percentage of GDP has been relatively unchanged and different measures of Swedish companies' participation in value chains indicate that it has fallen (see Figure 4) and the percentage of intermediate inputs in foreign trade is also significantly lower than the historical average (see Figure 6). It is therefore difficult to believe that developments in global value chains provide an important reason for the weaker inflation in the years after the financial crisis.

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<sup>38</sup> Among others, Auer and Fischer (2010) find that foreign trade affects producer prices, while studies investigating the relationship with inflation at aggregate level often have mixed results. See Westermark (2019) for an overview of the literature dealing with the effect of foreign trade on inflation and wages. McLeay and Tenreiro (2019) also show how the aggregate relationship between resource utilisation and inflation can hide an underlying relationship due to the shocks to which the economy is exposed.

## Appendix 1: Breaking down changes in import content

More detailed data over the import content in exports by different sectors to different destinations can be obtained by breaking down the aggregate change in Swedish import content in exports between 2008 and 2015,  $\Delta FV_t$ , into five parts; see equation (1):<sup>39</sup>

$$\Delta FV_t = PS + LS + IE + II + IIPL \quad (1)$$

$$PS = \sum_j \Delta m_{j,t} * FV_{j,t-1}$$

$$LS = \sum_i \Delta m_{i,t} * FV_{i,t-1}$$

$$IE = \sum_j \sum_i \Delta m_{ij,t} * FV_{ij,t-1} - PS - LS$$

$$II = \sum_j \sum_i \Delta FV_{ij,t} * m_{ij,t-1}$$

$$IIPL = \sum_j \sum_i \Delta FV_{ij,t} * \Delta m_{ij,t}$$

in which  $i$  is a sector,  $j$  is a trading partner,  $m$  is the weight in Swedish exports and  $FV$  is import content.  $\Delta$  is the change between 2008–2015. The five parts are:

- Product shift (PS), which is the change due to various sectors changing their weight in Swedish exports.
- Country shift (LS), the change due to various countries changing their weight in Swedish exports.
- Interaction effect (IE), a cross-term that considers that specific markets, defined as product-country combinations, have changed weight in Swedish exports.
- Import content in product-country combinations (II) is a term that considers that the import content in exports to specific markets (product-country) has changed.
- The combination of changed import content and the significance of specific product-country combinations in Swedish exports (IIPL) is a cross-term for the change due to both the import content on specific markets and their relative weight in Swedish exports having changed.

<sup>39</sup> A variant of this kind of analysis is presented in Bugamelli et al. (2017). There, the authors focus in the development of Italian export market shares. The focus here lies instead on how the Swedish import content in exports has changed.

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