



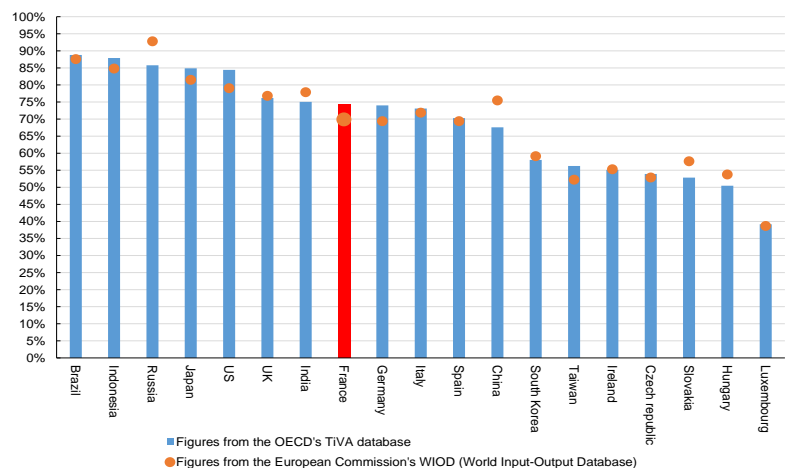
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TRÉSOR-ECONOMICS

France's trade in value added

- Foreign trade can be analyzed in terms of the domestic value added contained in exchanges. This enables each economy's own contribution to its exports to be pinpointed, excluding those of other countries involved in the manufacturing process.
- In the value added approach, the aggregate trade balances of each country are the usual trade balances, but bilateral balances between countries and sectoral balances may differ substantially from the traditional approach. As a result, France's main bilateral external deficits in 2011, namely with China and Germany, were lower by reasoning in value added, reflecting the fact that many of the French imports from China and Germany include inputs imported from third countries. Considered in value added terms, French exports also seem less reliant on the European market.
- Nevertheless, the relative role of business sectors in France's balance of goods and services deficit varies only slightly if value added data is used instead of traditional data.
- Trade in value added data points to the fact that France increasingly participates in global value chains (GVCs). In 2011, its participation in GVCs was in line with the OECD average.
- That year, France's position, like Germany's, was slightly downstream in GVCs, whilst the majority of the main developed economies, inter alia the US, Japan and the UK, were positioned more upstream.
- France should further promote innovation to roll out high value added activities like design and R&D that appear upstream in the value chains. This would also provide more resilience to possible supply shocks from countries placed further upstream in GVCs.
- Foreign trade barriers cumulate along value chains and are therefore more detrimental to countries that are highly integrated in GVCs. In other words, these countries are set to greatly benefit from the implementation of trade deregulation policies.

Integration in global value chains
Share of value added exports in the total exports of the country under review in 2011



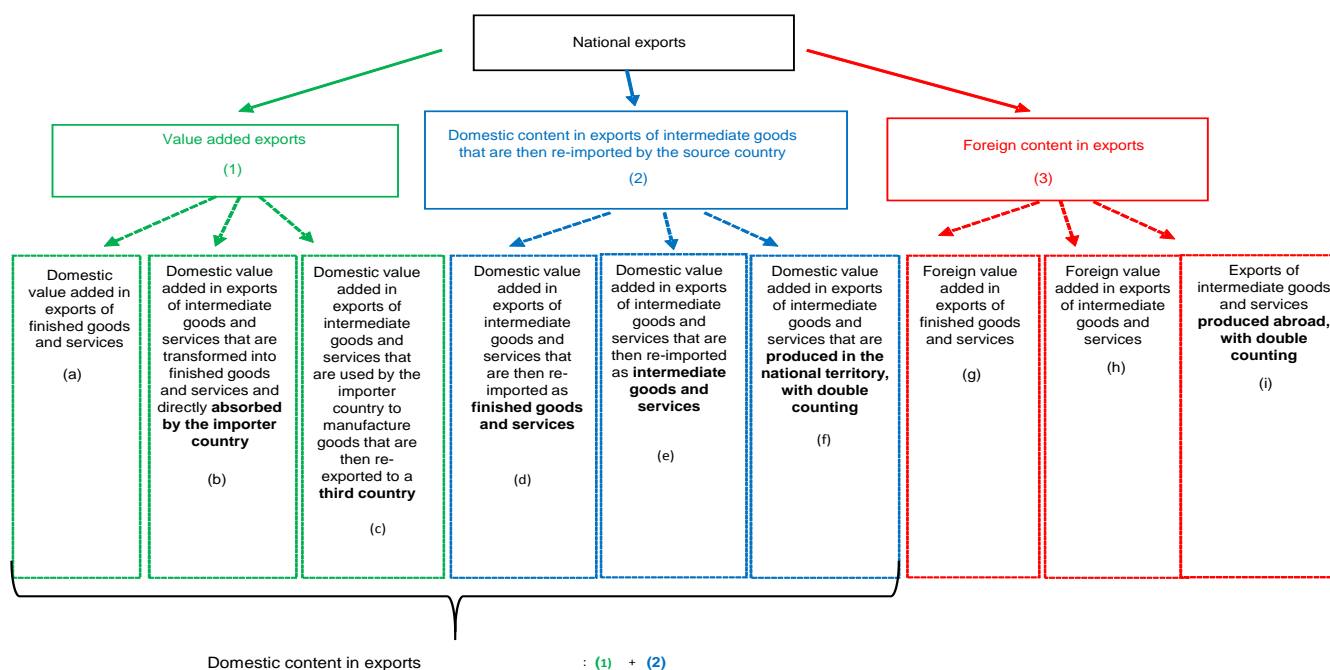
Sources: OECD, European Commission, DG Trésor.

1. A value added approach to foreign trade provides a better understanding of the nature and the dynamics of international exchanges

Traditional foreign trade statistics only provide a limited picture of international exchanges. Indeed, they do not identify countries' individual contributions to globalized manufacturing processes, often involving the importation of inputs to produce the exported goods and services. The trade in value added method corrects this by identifying the domestic value added contained in national exports¹, to wit the difference between the production value of the goods and services exported by the country under review and the inputs that it imports.

Box 1 : Notions used to assess trade in value added

In recent years, a number of databases concerning trade in value added have been set up. They are based on strong assumptions that can provide varying outcomes, especially with very close analysis. Consequently, to ensure reliable conclusions, bilateral and sectoral studies of France's trade in value added make joint use of two databases: the OECD's and WTO's TiVA (Trade In Value Added) database and the European Commission's WIOD (World Input-Output Database). However, although the OECD's database contains predefined indicators to measure France's trade in value added, the Commission's database only provides inter-country input and output tables. As a result, work has been carried out to produce indicators that are similar to those mentioned in the TiVA database using the WIOD and following OECD methodology². As the TiVA database's most recent available data is for 2011, that year was used as a benchmark for this study. The indicators were built up using the notions that have been put forward by various authors over time to best identify value added. The concept of "domestic content in exports", coined by Koopman in 2012, is the broadest as it incorporates the transactions covered by cases a) to f) of the table. Owing to data availability issues, the concept of "value added exports" (cases a) to c) of the table), which was suggested by Johnson and Noguera in 2010, was often preferred for this study.



¹ The table in box 1 is based on the one set out in Koopman R., Wang Z., Wei S.-J. (2012) "Tracing Value-Added and Double Counting in Gross Exports", *NBER Working Paper* No. 18579, November. For further details on the method for assessing trade in value added, refer to Berthaud F. (2018), "Le commerce en valeur ajoutée", Directorate General of the Treasury, *working paper* (to be published).

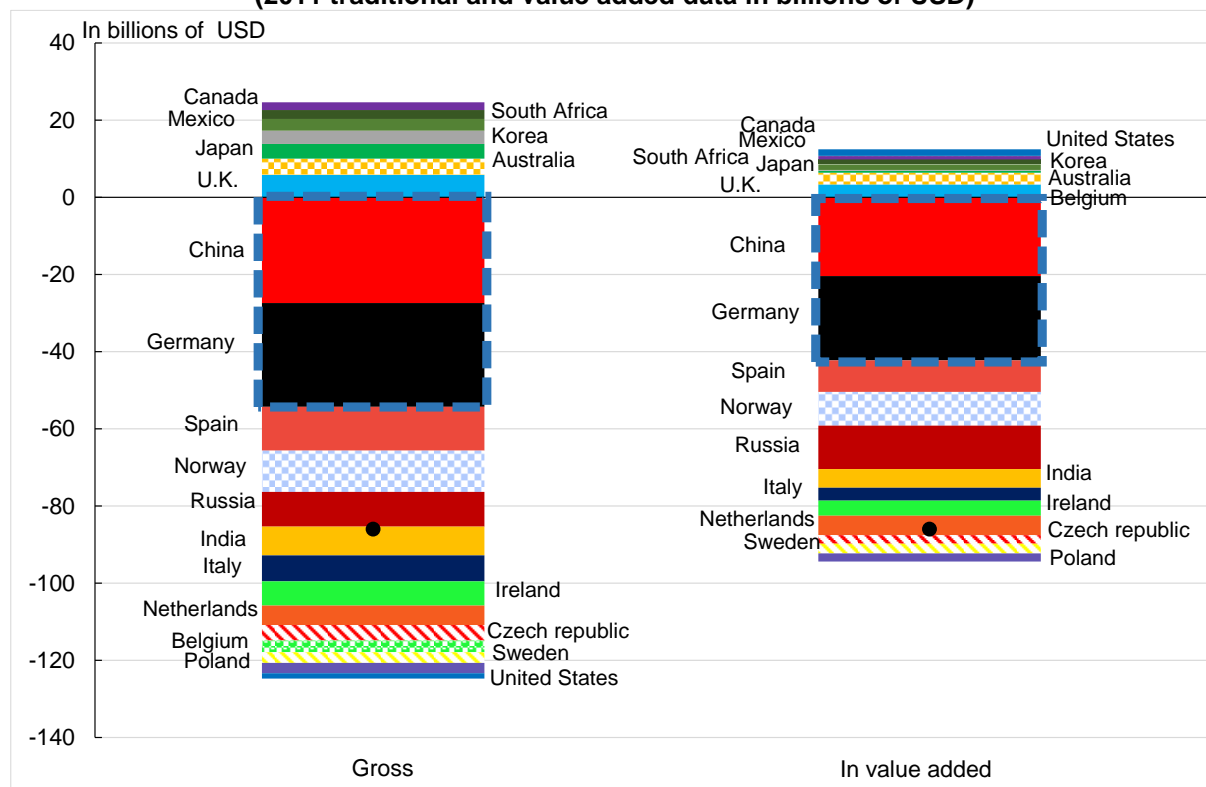
² OECD (2015), "TiVA 2015 indicators — definitions", version 2, October.

2. The value added approach alters the view of French foreign trade at bilateral level but less so at sectoral level

2.1 Accounted for in value added, the contributions of Germany and China to France's external deficit are considerably smaller

Without changing France's aggregate balance of goods and services, value added data provides an alternative view of the country's bilateral and sectoral balances. Using traditional data, China and Germany were by far the main contributors to France's balance of goods and services deficit in 2011. This is still the case using value added rationale although it is less pronounced: a quarter less deficit with China and a fifth less vis-à-vis Germany (see chart 1).

Chart 1: France's bilateral balances of goods and services (2011 traditional and value added data in billions of USD)



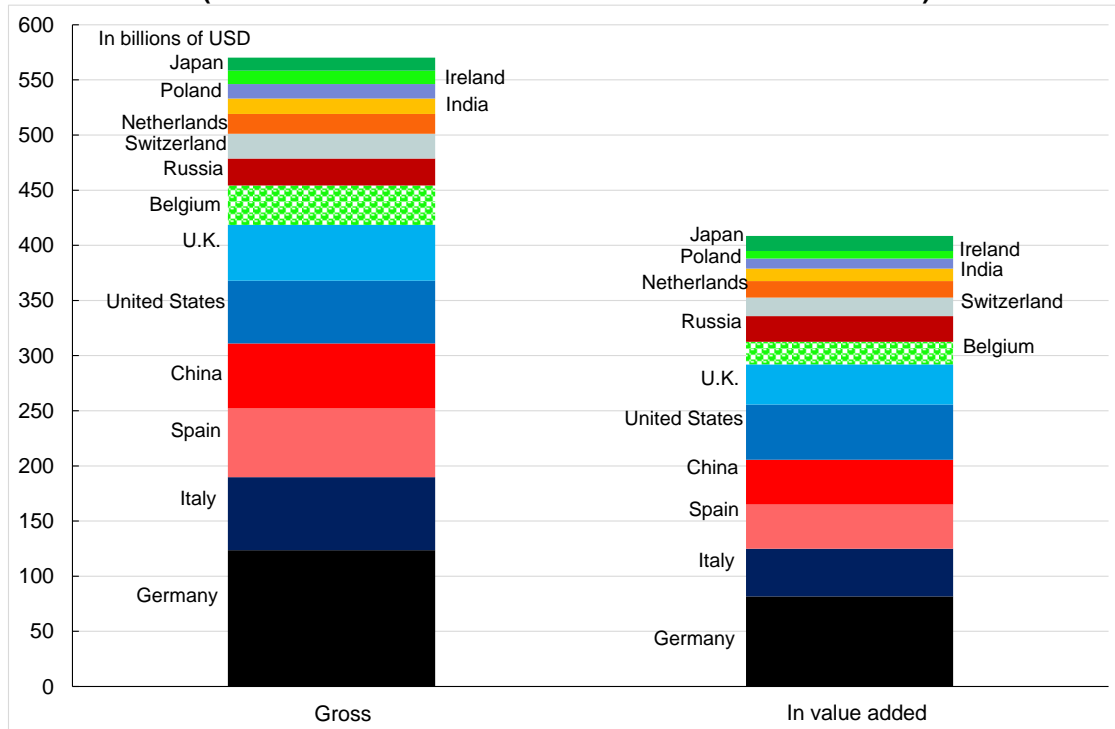
How to read this chart: the circles represent the total amount of France's balance of goods and services. The superimposed bars show the amounts of the bilateral balances. Only the main bilateral balances appear in this chart so their total does not necessarily amount to the total balance.

Sources: OECD, DG Trésor calculations.

The explanation is that, with value added rationale, Germany and China export much less in terms of value to France than suggested by traditional data (An average of 35% less in 2011, see chart 2). Indeed, Germany and China export to France some products including inputs, required for their manufacturing, that are imported from other countries. In addition, France exports products containing German and Chinese value added to third countries³.

³ For that amount, gross German and Chinese exports to France become German and Chinese exports to third countries in value added.

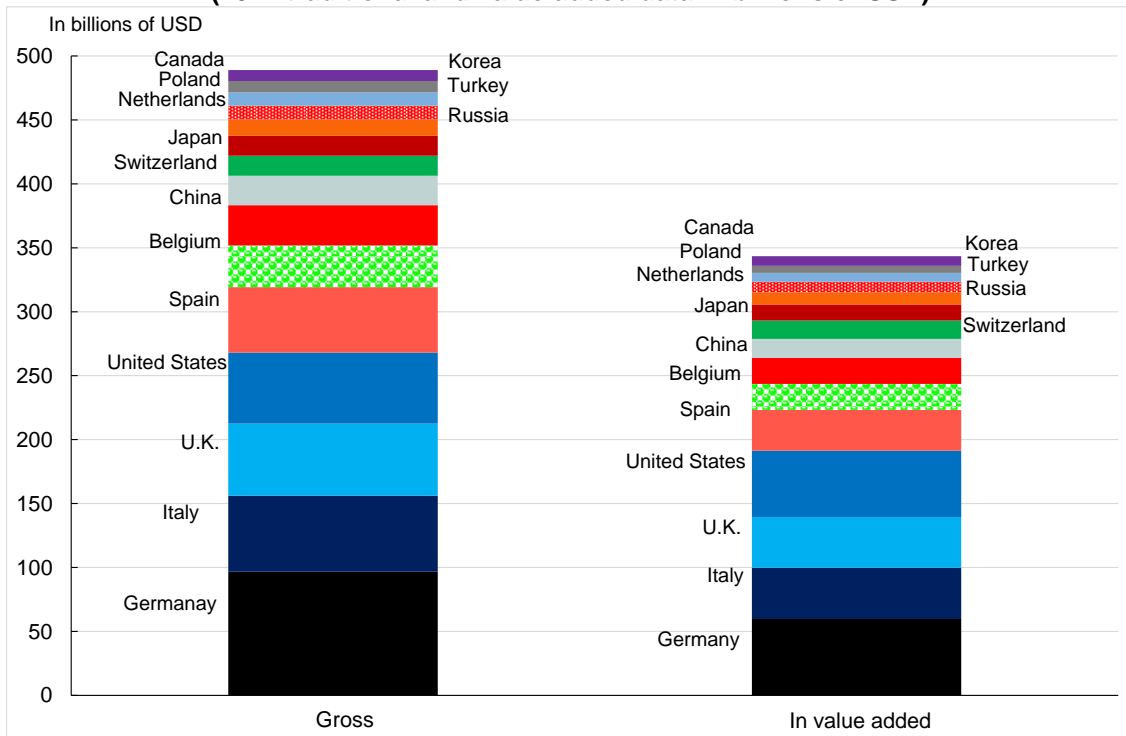
**Chart 2: France's main bilateral imports of goods and services
(2011 traditional and value added data⁴ in billions of USD)**



NB: Data for Sweden and Norway missing.
Sources: OECD, DG Trésor calculations.

Moreover, using value added rationale, the French export sector seems less reliant on the European market. In 2011, according to value added data, a third of total French exports were to the EU's main countries compared with around half according to traditional data (see chart 3). Conversely, value added data for French exports to the US and Japan are comparable to traditional data.

**Chart 3: France's main bilateral exports of goods and services
(2011 traditional and value added data in billions of USD)**



Sources: OECD, DG Trésor calculations.

⁴ To understand this chart's value added data, it should be construed as being bilateral exports in value added to France.

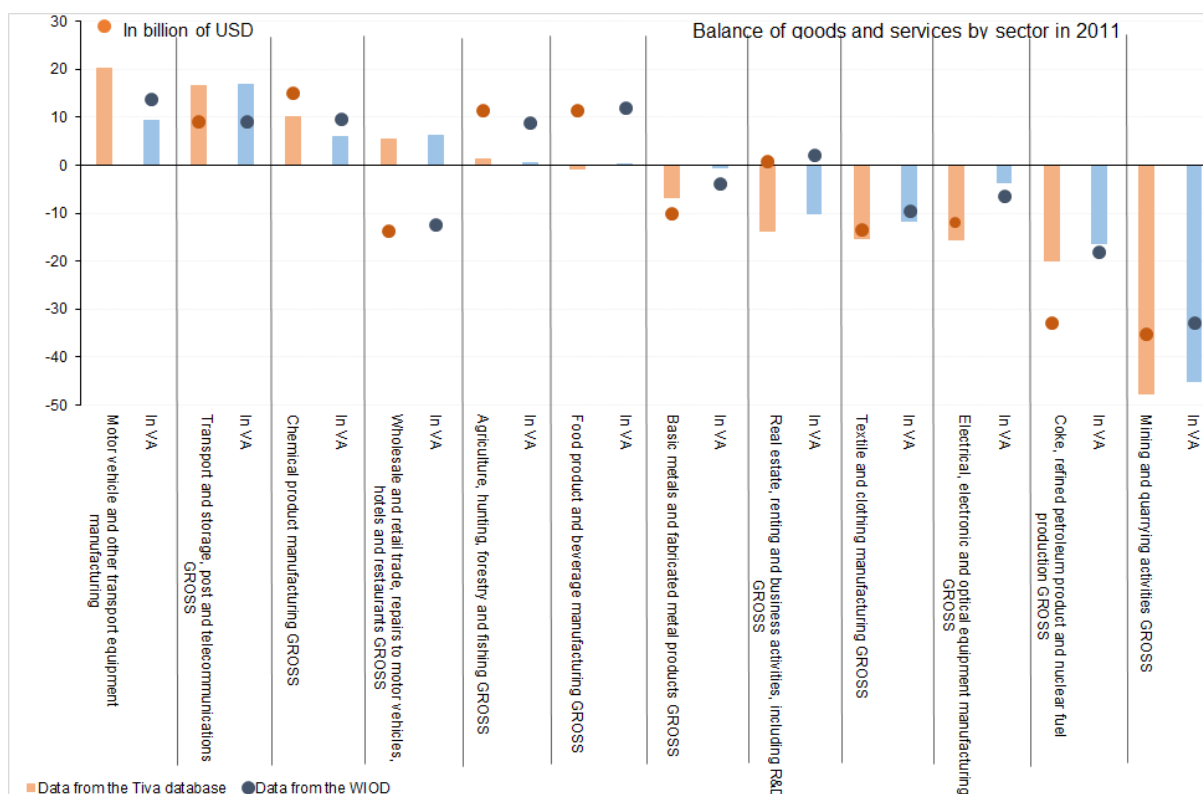
2.2 The approach in value added only marginally alters the relative role of business sectors in the French external deficit

Using value added rationale has limited impact on the sectoral breakdown of the French external deficit inferred from traditional data⁵.

In 2011, the main sectors contributing to the French deficit in value added were as follows (see chart 4): 1/ mining and quarrying activities; 2/ coke, refined petroleum product and nuclear fuel production; 3/ electrical, electronic and optical equipment manufacturing; 4/ textile and clothing manufacturing. It should be mentioned that mining and quarrying activities, which contain few inputs, had a deficit in value added which was comparable to that using traditional data.

In 2011, France had major surpluses in value added in the following sectors: 1/ motor vehicle and other transport equipment manufacturing; 2/ transport and storage, post and telecommunications; 3/ chemical product manufacturing.

Chart 4: Sectoral breakdown of France's balance of goods and services (2011) – Main sectoral surpluses and deficits



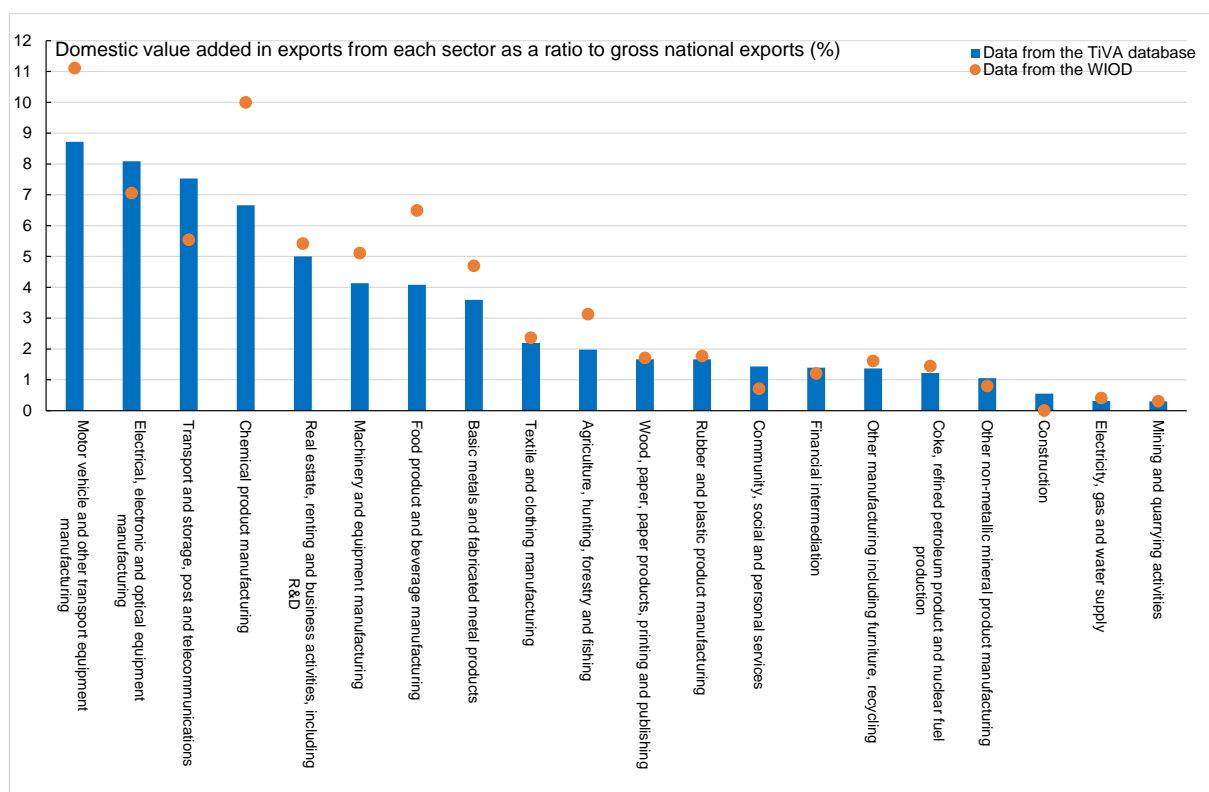
How to read this chart: The bar chart expresses data from the TiVA database and the scatter graph reflects that from the WIOD. For each sector, GROSS represents the sector's gross balance and VA corresponds to the sector's value added balance.

Sources: OECD, WIOD, DG Trésor calculations.

A number of French sectors have an external deficit in gross terms and in terms of value added although, in terms of the latter, they make a strong contribution to French exports (see chart 5). This applies primarily to the electrical, electronic and optical equipment manufacturing sector. Nevertheless, broadly speaking, the sectors which contributed the most domestic value added to gross French exports in 2011 recorded substantial external surpluses. This concerned the motor vehicle and other transport equipment manufacturing sector, the transport and storage, post and telecommunications sector, and the chemical product manufacturing sector (ratios of over 6%).

⁵ French exports in value added for a given sector (i.e. electronics) include the domestic value added generated by this sector which is incorporated into the gross French exports of other sectors (for instance motor vehicles). However, they exclude the value added of other French sectors (for instance chemical products) which is included in the national exports of the sector under review (i.e. electronics). See Koopman R., Wang Z., Wei S.-J. (2012), "The value-added structure of gross exports: measuring revealed comparative advantage by domestic content in exports", *NBER*, page 22.

Chart 5: Contribution in value added of each sector to gross French exports in 2011⁶



Sources: OECD, European Commission, DG Trésor calculations.

A value added approach also allows bilateral analyses to be carried out by cross-referencing the bilateral and sectoral dimensions, and by therefore highlighting the relative role of partner countries in the main sectoral deficits of France's balance of goods and services⁷.

3. France takes an increasing part in global value chains, in a slight downstream position

3.1 France is becoming more and more integrated in global value chains

Global value chains (GVCs) cover businesses' entire global manufacturing process, from the design of a product up to its delivery to the end consumer. They partly structure international trade by providing fresh bilateral and sectoral dynamics.

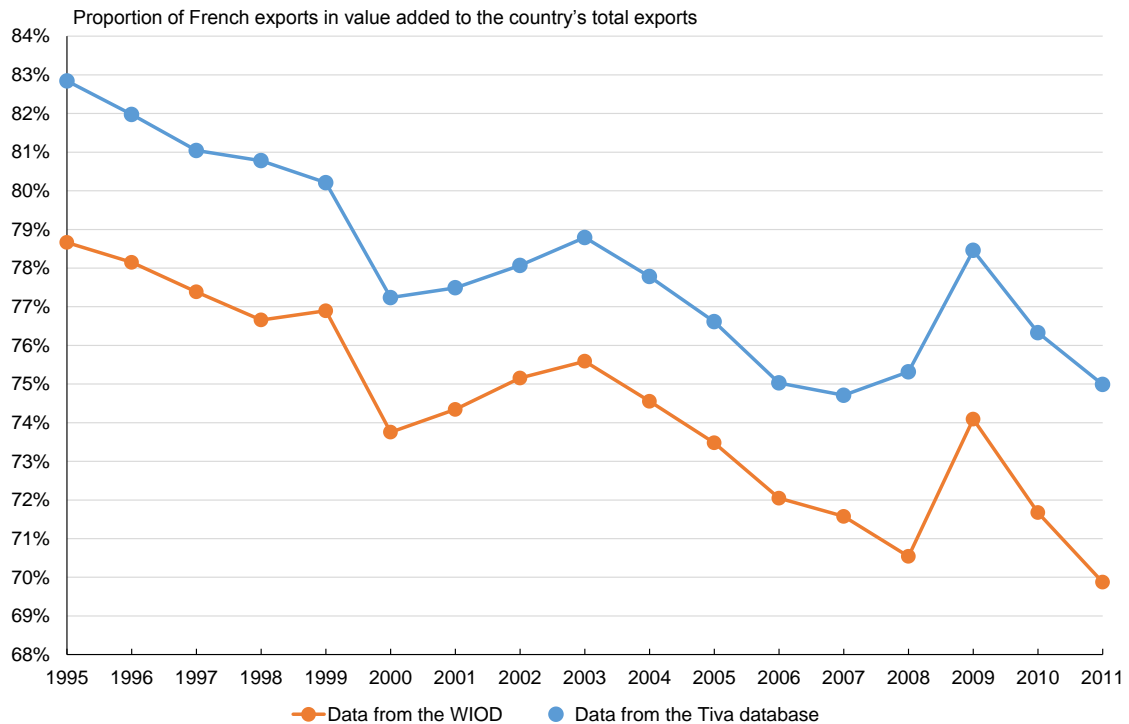
The extent of a country's integration in GVCs may be assessed by factoring in the proportion of exports in value added to gross national exports, which is known in economic literature as the VAX ratio. A low ratio means that the intrinsic contribution of domestic exporters to national exports is limited. In this case, the amount of gross exports is principally explained by the use of imported foreign inputs in the manufacturing process. This in turn points to the fact that the country is well integrated in GVCs.

There was a downtrend in the proportion of French value added in the country's total exports between 1995 and 2011 (see chart 6) according to data from the WIOD (down 9 percentage points to 70%) and from the TiVA database (down 8 percentage points to 73%). As for the majority of other countries, France has therefore become more integrated in GVCs over time. The fall in the VAX ratio was particularly pronounced during the second half of the 1990s but subsequently levelled off. As a result, the process of integration of France in GVCs has taken place over a fairly long period. Following a one-off hike in 2009 owing to the crisis, the VAX ratio returned to its pre-crisis level in 2011.

Chart 6: Share of French value added in French total exports (VAX ratio) between 1995 and 2011

⁶ The substantial gaps observed between the two sources in certain sectors are explained in Berthaud F. (2018), "Le commerce en valeur ajoutée", Directorate General of the Treasury, *working paper* (to be published).

⁷ This analysis is conducted in Berthaud F. (2018), "Le commerce en valeur ajoutée", Directorate General of the Treasury, *working paper*, pages 37 to 60.



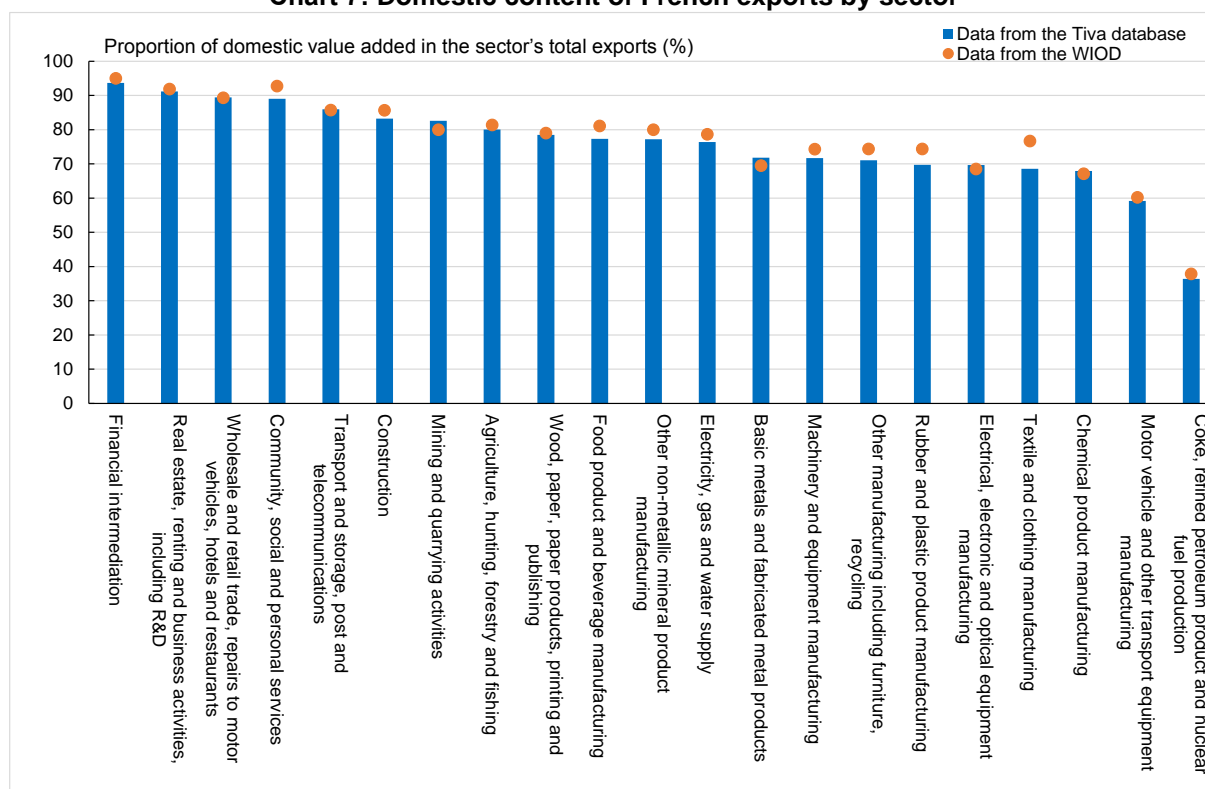
*How to read this chart: A fall in the VAX ratio corresponds to the country's increasing integration in GVCs.
Sources: OECD, European Commission, DG Trésor calculations.*

On the basis of this indicator, France was positioned amongst the average of OECD countries in 2011 (see chart on page 1). The highest ratios were for the major commodity exporters (Saudi Arabia and Russia) owing to the nature of their activities, as well as South American countries (Colombia, Brazil and Argentina). Conversely, the lowest ratios were in Luxembourg, Ireland, central and eastern European countries (Hungary, Slovakia, Czech Republic, etc.) and in a number of Asian countries (South Korea, Singapore, Taiwan, etc.) which are highly integrated in regional value chains.

The extent of France's integration in GVCs can be more precisely assessed, on one hand, according to the sector taken into account and, on the other, by looking at the interlinkage between sectors. Those in which the domestic content in exports is the lowest (see chart 7) are, firstly, the coke, refined petroleum product and nuclear fuel production sectors (with the domestic content in exports accounting for slightly more than a third of the sector's total exports). In second place is the motor vehicle and other transport equipment manufacturing sector (around 60% of the sector's total exports).

The sectors with the highest domestic content in exports are the service sectors and, in particular, the financial intermediation sector (over 95% of the sector's total exports) and the real estate, renting and business activities, including R&D, sector (over 90%).

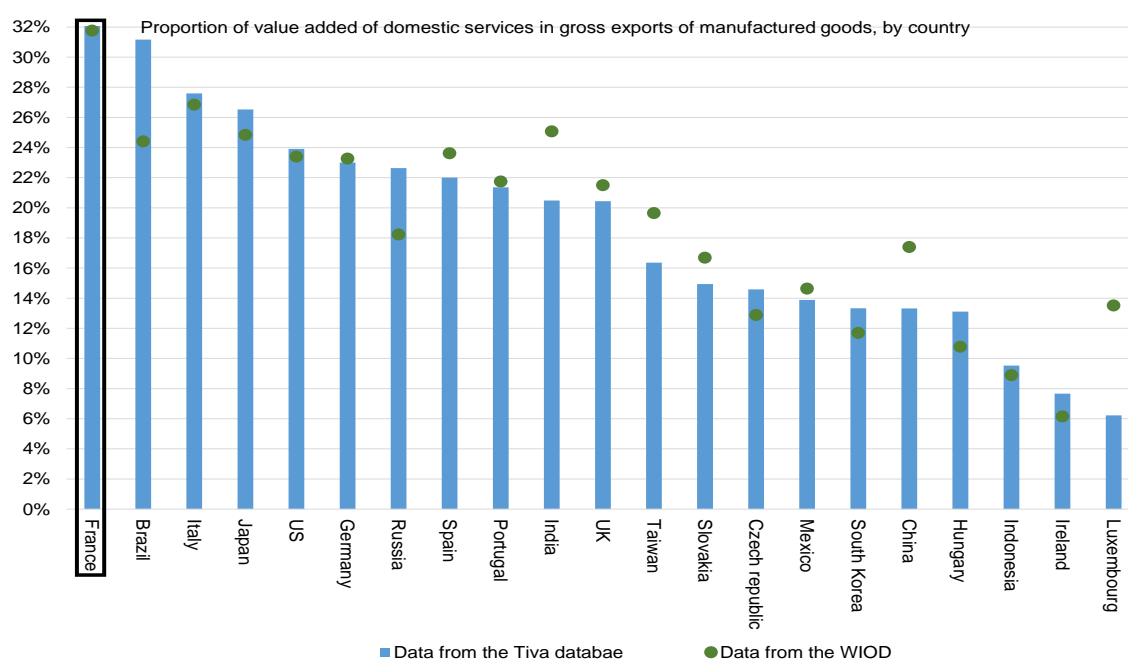
Chart 7: Domestic content of French exports by sector



Sources: OECD, European Commission, DG Trésor calculations.

Statistics for exports of manufactured goods often include the services used for their production. In France, in 2011, according to the WIOD and the TiVA database, the amount of domestic services incorporated into exports of manufactured goods stood at 32% of national exports of these goods (see chart 8), namely the highest ratio for the countries listed in the two databases. This outcome implies that (i) the border between goods and services is porous and that French exports of manufactured goods often contain services; (ii) for France, these services are often provided by domestic businesses. Ultimately, this underscores the major role of domestic services in ensuring export competitiveness.

Chart 8: Value added of domestic services incorporated into exports of manufactured goods, by country



Sources: OECD, European Commission, DG Trésor calculations.

Lastly, and more precisely, by differentiating the various categories of services, it seems that the domestic and foreign value added⁸ of services to businesses incorporated into exported manufactured goods was especially high for France in 2011. It accounted for almost 20% of national exports of these goods.

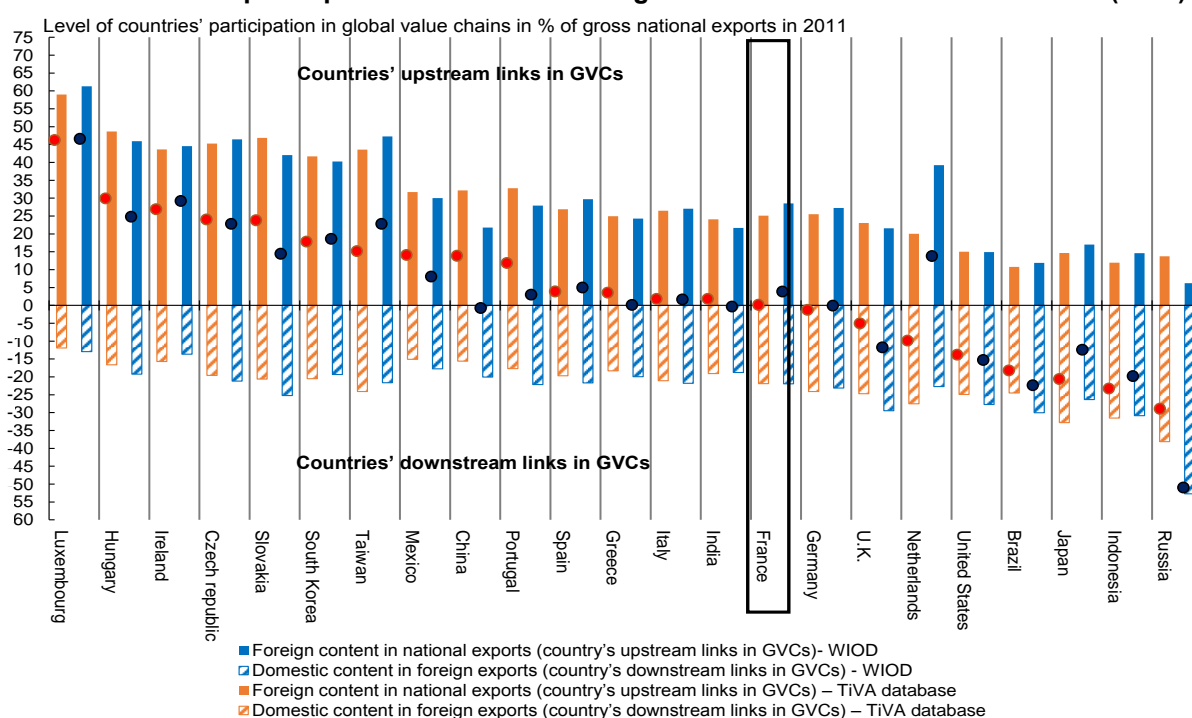
3.2 In 2011, France is positioned slightly downstream in GVCs

France's participation in GVCs can be more broadly assessed using the GVC participation index. This factors in both the upstream (for France, the foreign content in gross French exports) and downstream (the French content in gross foreign exports) links in the chain⁹. Combining these two ratios gives a country's position in GVCs.

In 2011, the extent of France's participation in GVCs was in line with the average of OECD countries (see chart 9). It was 47% according to the TiVA database and 50.5% according to the WIOD. To draw a comparison, that year, the most integrated countries were Luxembourg, a number of Asian countries (Taiwan, South Korea, etc.) and central and eastern European countries (Slovakia, Hungary, Czech Republic, etc.). For the latter, the indicator stood at over two thirds of gross national exports. Conversely, Brazil, the US and India were among the least-integrated in GVCs.

France's upstream links in GVCs were slightly higher than the downstream links. This means that, in 2011, France was positioned slightly downstream in GVCs. It should be mentioned that the gap between the foreign content in gross national exports and the domestic content in gross foreign exports was higher in the WIOD (28.5% and 22% respectively) than in the TiVA database (25% and 22%): data from the WIOD therefore put France slightly more downstream than data from the TiVA database.

Chart 9: Extent of countries' participation in GVCs according to the TiVA database and the WIOD (2011)



How to read this chart: the vertical bars above (and below) the x-axis represent the countries' upstream (downstream) links in GVCs. The OECD data are in orange and these of the European Commission are in blue. The red circles show the countries' position in GVCs according to data from the TiVA database. For instance, if the circle is above the x-axis (as is the case for France), this means that that country is positioned downstream in GVCs. Indeed, the country's upstream links in GVCs are higher than its downstream links.

⁸ When there is a breakdown by category of services, the chosen notion is broader as it includes both the domestic value added of services and their foreign value added. It enables the overall level of interlinkage between the various categories of services and the manufactured goods sector to be assessed. The drawback is that this notion fails to provide information on the origin of the value added of the types of services incorporated into the manufactured goods.

⁹ The upstream and downstream links are added up and divided by gross national exports. The foreign content in national exports is the value of imported inputs that are incorporated into gross exports, divided by gross exports. The domestic content in foreign exports reflects the domestic value added in foreign countries' exports to third countries, divided by gross exports.

France's positioning slightly downstream in GVCs according to the GVC participation index, which is assessed on the basis of the WIOD and the TiVA database, is similar to the position of certain southern European countries (inter alia Italy and Spain, and even Portugal) and to that of Germany. Conversely, most of the main developed economies are positioned upstream in GVCs (the US and Japan (very pronounced), and the UK (to a lesser extent)).

4. Value added data enables a number of economic policy recommendations to be fine tuned¹⁰

4.1 France could benefit from positioning itself on segments with high value added, further upstream in global value chains

France's slightly downstream position in GVCs (like Germany and a number of southern European countries), whilst most of the main developed economies are positioned upstream, does raise certain issues concerning (i) a country's appropriate position in a value chain and (ii) the economic repercussions of a downstream or upstream position in a value chain.

- (i) The country's position in a GVC is one of the factors that determine the gains to be made from participation in this chain. For instance, emerging economies have often focused on low value added activities, before moving up the value chain by progressively cutting back on assembly activities with low value added. This is tantamount to gradually moving towards the extremities of GVCs. A number of developed economies concentrate on activities that generate the most value added which are often located upstream (design, etc.) and downstream (marketing, etc.) in GVCs.

In tangible terms, introducing a policy to expand R&D would position the country more upstream in GVCs, where value added is higher. That said, in practice, international trade also encourages countries to position themselves where they enjoy a comparative advantage. They then go on to consolidate this advantage rather than trying to position themselves in the highest value added segments of the GVC¹¹. By factoring in this constraint due to the presence of a comparative advantage that the country wants to keep¹², the country's optimum position in the GVC will be dictated by the features of the sector carrying its comparative advantage. As a result, when designing the finished good requires a large number of commodities that the country does not possess, it will consolidate a comparative advantage located in a more downstream segment of the GVC. This advantage may, for instance, be a high-tech niche integrated in a more global production process and therefore not necessarily located at the extremities of the GVC.

Against this backdrop, France's slightly downstream position implies that it has established comparative advantages in sectors requiring substantial resources to be supplied by other countries. At the same time, France maintains a moderate presence in high value added segments located upstream in GVCs, such as design and R&D.

- (ii) A country's participation in a GVC means that it is vulnerable to the shocks affecting the chain's other participants. This is due to their interconnection in the globalized production process. A country positioned downstream in a GVC (like France) will be more sensitive to supply shocks (which have a knock-on effect, for instance, on prices or the supply of intermediate or finished products) originating from countries placed more upstream in GVCs. On this basis, France has every interest in rolling out policies to foster innovation and R&D. In this way, it would position itself in high value added segments more upstream in GVCs and would be less sensitive to these supply shocks.

¹⁰ Economic policy recommendations are set out more comprehensively in the following document: Berthaud F. (2018), "Le commerce en valeur ajoutée", Directorate General of the Treasury, *working paper* (recasting rules of origin, bilateral external imbalances reduction mechanisms, etc.).

¹¹ OECD (2013), "Interconnected Economies: Benefiting from Global Value Chains".

¹² In some cases, the country may also attempt to progressively evolve this comparative advantage.

4.2 A value added approach emphasizes the benefits of open trade policies, in particular for France

Traditional data does not cover all the constraints thrown up by trade barriers (customs duties, export taxes, quotas, non-tariff barriers, etc.) for countries participating in GVCs. These barriers increase the cost of exchanges throughout the various stages of the production process. By accumulating, they have a direct impact on countries positioned downstream in GVCs¹³, to a greater extent than implied by the traditional approach.

- *As regards imports*: when a country imports intermediate goods and services that will be incorporated into its exports, it incurs additional costs due to the effective barriers more upstream in GVCs. The more fragmented the GVC, the more tariff barriers accumulate, and this increases the cost of imports.
- *As regards exports*: the country encounters tariff barriers when it exports intermediate or finished goods as part of a globalized production process. These export taxes and quotas may increase costs during the following stages of the GVC.

In light of the foregoing, when countries participate in GVCs, their gains owing to lower customs duties and the removal of trade barriers are higher than suggested by traditional data¹⁴. This means that trade policies are even more important today as GVCs have substantially expanded in recent decades.

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¹³ Beyond this mechanical effect, second-round effects may also have an impact on countries positioned more upstream in GVCs. The size of this channel will be dictated by how the downstream country passes on import costs in its price and tariff policy. See OECD (2013), “Interconnected Economies: Benefiting from Global Value Chains”.

¹⁴ Johnstone N., Criscuolo C. and Timmis J., “The relationship between GVCs and Productivity” (2016), OECD, page 12.

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