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in Value-Added

An OECD-WTO Joint Initiative

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Increasing Importance of Global Value Chains

Globalization continues apace and world trade is increasingly structured around “global value chains” (GVCs). A value chain can be simply defined as the full range of activities that firms do from the conception of a product to its end use. These activities, such as design, production, marketing and support, are increasingly spread over different countries and have reshaped international trade in several ways. International trade is now mostly trade in intermediate goods and services and new paradigms, such as “trade in tasks”, are suggested to explain trade patterns.

The concept of GVC was introduced in the early 2000s and has been successful in capturing several characteristics of the world economy. First, GVCs are useful to apprehend the increasing fragmentation of production across countries. They link geographically dispersed activities in a single industry and help us to understand shifting patterns of trade and production. Second, GVCs highlight the specialization of countries in tasks and business functions rather than specific products. While most analytical frameworks still assume that goods and services are produced domestically and compete with “foreign” products, the reality is that most goods and an increasing number of services are “made in the world” and that countries compete on economic roles within the value chain. Lastly, GVCs emphasize the role of networks, global buyers and global suppliers. Global value chain analysis gives insights into economic governance and helps to identify firms and actors that control and coordinate activities in production networks.

Policymakers everywhere are looking for more and better policy evidence to examine how their countries can maximize the benefits from global production. But while the role of GVCs is acknowledged, there are few data that can describe what happens in production networks. In the past few years, many observers have noted that trade statistics measured in gross terms do not give us the full or accurate picture of trade relationships within global value chains.

What Current Trade Statistics Do Not Tell Us

Gross recording of trade flows is not an issue by itself; as a matter of fact, it is essential to deal with monetary issues, global imbalances or consumer spending on foreign goods. But it can be misleading, as is often the case, when one crudely relates gross flows of exports with domestic value-added and national income, or its components such as profits or wages, and by extension, employment. For example, an exported good may require significant intermediate

inputs from domestic manufacturers, who, in turn, require significant intermediate imports. Much of the revenue from selling the exported good may accrue abroad to reflect purchases of intermediate imports used in production, leaving only marginal benefits in the exporting economy. An often-cited case study that clearly illustrates the issue relates to the production of an Apple iPod. The study showed that of the \$144 Chinese factory-gate price of an iPod, less than 10% contributed to Chinese value-added, with the bulk of the components (about \$100) being imported from Japan and much of the rest coming from the US and South Korea.

The first concern is therefore the implicit multiple counting of intermediate goods and services when trade is measured in gross terms. The statistics potentially overstate the importance of trade and when world trade is calculated as an aggregation of all bilateral flows, the value of the same labor, capital or intermediate input is implicitly counted as many times as it crosses a border for further processing. The second issue, and perhaps the most important, is the fact that exports increasingly embody intermediate inputs sourced from abroad, making it difficult to identify the real contribution a given export may make to an economy’s material well-being, be that in terms of income or employment. Moreover, conventional trade statistics are not necessarily able to reveal those sectors of the economy where value-added originates. In developed economies a large share of the total value-added generated by manufactured exports originates in the service sector and this is not reflected in gross trade statistics.

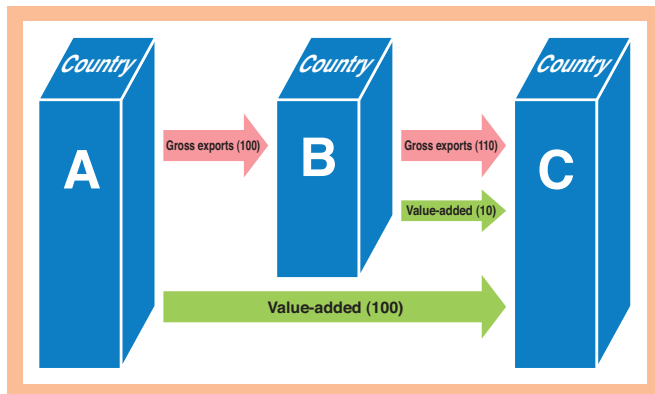
What Is Trade in Value-Added?

The measurement of trade in value-added terms aims at accounting for the double counting of intermediate inputs implicit in current gross flows of trade. The new metric will measure flows related to the value that is added by a country in the production of any good or service that is exported. This value-added represents the remuneration of factors of production in the domestic economy (labor compensation and profits), as well as taxes.

A simple example illustrates this in [Chart 1](#). Country A exports goods, produced entirely within A, worth 100 to country B, which further processes them before exporting them to C where they are consumed. B adds value of 10 to the goods and so exports 110 to C. Conventional measures of trade show total global exports and imports of 210 but only 110 of value-added has been generated in their production. Conventional measures also show that C has a trade deficit of 110 with B, and no trade at all with A, despite the fact

CHART 1

Value-added versus gross exports: a simple example



Source: OECD

that A is the chief beneficiary of C's consumption. If instead we track flows in value-added, C's trade deficit with B reduces to 10 and it now runs a deficit of 100 with A. The fact that A and C are indirectly trade partners in a GVC is reflected in the value-added measure while in gross terms there is no trade between the two countries.

How Are OECD & WTO Going to Measure Trade in Value-Added?

A number of academic studies, using a variety of sources, have sought to shed light on the topic but both the OECD and WTO feel that the field is now mature enough to move from academic research to regularly produced statistics. Providing a complementary indicator to gross flows that better reflects the existence of global value chains would improve the nature of the current debate on trade policy.

It requires the development of a new statistical model that is able to reflect global interdependencies in production. National input-output tables are able to track domestic value-added flows as they pass through the producers of a given economy but they are not able to identify where the value-added in imports originated. This is further exacerbated by the fact that the imports often themselves embody value-added that was exported (and then re-imported) by the domestic economy. To fully account for value-added flows,

therefore, and to construct measures of trade in value-added, a global input-output table is needed.

The OECD has a long history in the development of harmonized national input-output tables stretching back to the early 90s, and its database now covers more than 50 countries, representing about 95% of world trade and GDP. The initiative to measure international trade in value-added integrates these national tables into a global system by using additional information on bilateral trade in goods and in services. With the creation of an OECD Inter-Country Input-Output (ICIO) model, the analysis of GVCs from a truly global perspective and the development of trade statistics in value-added terms are now possible. A first version of the model details all transactions between 57 economies (56 countries plus the "rest of the world") for 37 industries. In contrast, previous research often used input-output data for a limited or even single country, hence offering only a partial picture of the GVC reality.

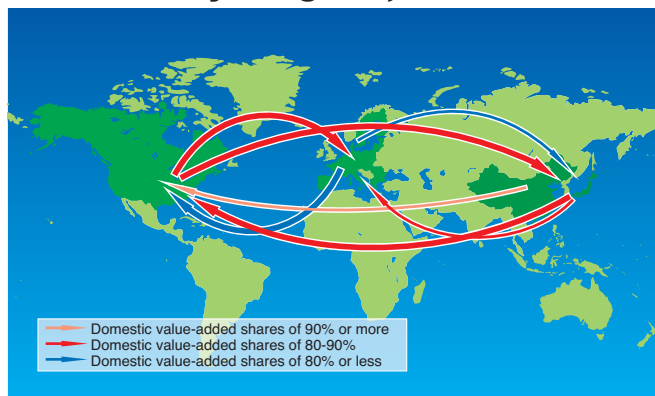
The work is designed to provide a means to develop these new metrics of trade on an on-going and long-term basis. In order to improve the quality and timeliness of the estimates, the program of work also seeks improvements in inputs from national authorities. It will capitalize on existing networks and build new ones. The agreement between the OECD and WTO is the most visible example, supported by collaboration with other agencies, such as IDE-JETRO in Japan and USITC in the US. Early provisional results were presented in May 2012 with more detailed results expected towards the end of the year.

Importance of Foreign Value-Added in Exports

On the basis of preliminary results, [Chart 2](#) and [Chart 3](#) illustrate how important it is to account for foreign value-added in exports. Aggregate trade flows between major regions in 1995 and 2005 are represented, with the size of the arrows reflecting the relative size of exports, shaded according to their domestic value-added content. In 1995, major trade flows were between the EU (27 member states), North America and Japan, with Chinese flows mainly reflecting exports to North America. Typical of the period was a relatively high domestic content of export flows, over 90%, in North America and Japan and over 85% in China.

CHART 2

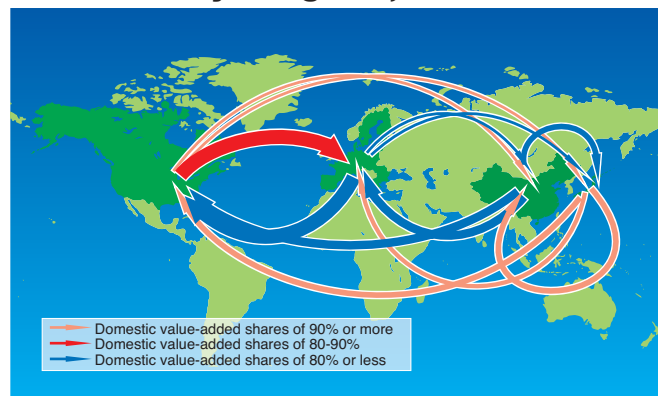
Domestic value-added in exports between major regions, 1995



Source: OECD ICIO model

CHART 3

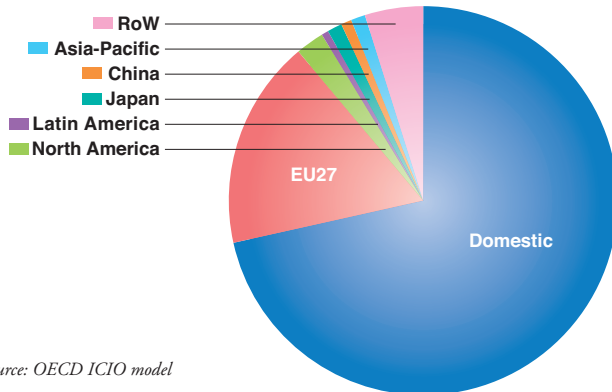
Domestic value-added in exports between major regions, 2005



Source: OECD ICIO model

CHART 4

Motor vehicles in Germany, domestic & imported content in value-added (2005)



Source: OECD ICIO model

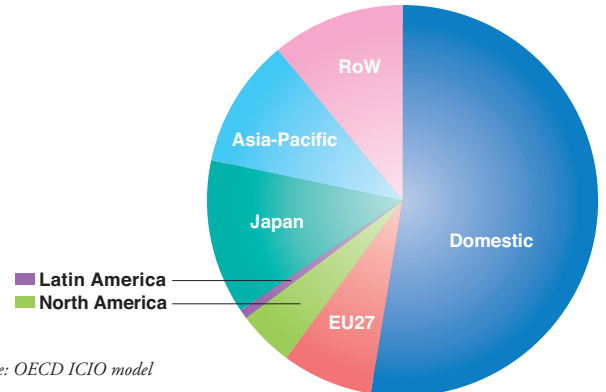
Fast forward 10 years and the pattern is of a much higher degree of fragmentation, with significant flows between China and all other major regions, and the emergence of a production hub in Asia. Only exports from North America to the EU retain the relatively high domestic value-added content seen in 1995, with the domestic value-added content of Chinese exports falling to about 75%. And the degree of integration is likely to have continued growing since 2005.

Another simple way of illustrating the relevance of value-added based measures of trade is to consider a product, such as a motor vehicle or computer, or, more precisely in this case, the motor vehicle or computer industries. With gross flows of exports, the full value of the car is attributed to the exporting country. But it is relatively easy to break this value down into the direct and indirect content provided by domestic and foreign suppliers, as shown in [Chart 4](#) for the German motor vehicle industry. This calculation also reflects the upstream impact of German suppliers on the motor vehicle industry who may have sourced their components, or parts of them, from abroad (this is the indirect part). [Chart 4](#) therefore looks at the value-added content of German motor vehicles by accounting for all direct and indirect effects. It shows that a significant share of the export of the motor car is value-added generated outside of Germany. Similar, more striking, patterns emerge in the computer industry in China ([Chart 5](#)) with almost half of the value-added being generated in other countries and mainly in Japan.

Indeed the pattern reveals that for many industries and countries, the higher up a product is in the value-added chain the greater the degree of international fragmentation. Our calculations reveal that in China exports of goods and services grew four-fold between 1995 and 2005, with much of this growth driven by exports of higher-technology goods, which increased by nearly \$300 billion over the period. But, at the same time, the foreign content of these exports also increased considerably. It rose from just over 10% to 25% of the total value of higher-tech products, such that the growth in Chinese value-added induced by higher-tech exports amounted to nearly \$100 billion less than the growth measured on a gross basis. The foreign content of lower-tech products remained largely unchanged, however.

CHART 5

Computers in China, domestic & imported content in value-added (2005)



Source: OECD ICIO model

What Are the Main Policy Implications?

Conventional measures of trade may create a risk of protectionist responses that target those countries at the end of global value chains, on the basis of an inaccurate perception of the origin of trade imbalances. The overall trade surplus or deficit of a country with the rest of the world is the same in gross and value-added terms, but measures of bilateral trade based on gross concepts can present a misleading picture of who ultimately benefits from the trade and exaggerate the importance of producing countries at the end of value chains. Value-added measures of bilateral trade better reflect who benefits, both in monetary terms and also, by extension, employment terms.

While there are concerns that imports threaten domestic jobs, the reality is that jobs are increasingly created as part of global value chains. Trade flows in value-added terms indicate where jobs are created and highlight the benefits of trade for all economies involved in the value chain. Interdependencies within global value chains are key to explaining the competitiveness of countries and the productivity gains that capitalize on these dependencies.

In addition, measures of trade in value-added terms can emphasize that protectionism is more costly in global value chains. When goods are produced in a single country, international trade is a competition between domestic and foreign goods. Countries can put in place barriers to discourage consumers from choosing the foreign product, and the political economy of trade opposes the gains from domestic producers sheltered from international competition to the losses of consumers who pay a higher price. This simple analysis that was at the heart of trade policy for centuries does not hold anymore in a world of offshoring and fragmented production processes. Indeed “beggar thy neighbour” strategies can turn out to be “beggar thyself” miscalculations. Returning to the schematic above, if C exported goods worth 90, say, to A, which in turn used these to produce its 100 in exports, policies initiated by C in response to a deficit with B would have their greatest impact on the sector in C producing intermediate goods for A.

When goods (or services) are “made in the world”, domestic producers capture a share of the GVC income and what happens to

them depends on trade barriers put in place by all countries involved in the value chain, whether as importers of intermediate inputs or importers of final goods and services. The position of countries in the value chain and their share of the overall GVC income become determinants of how trade barriers affect producers. The consequence is that trade policies are much more interdependent and that the analysis of the gains from trade and impact of protectionist policies is more complicated.

Lastly, there are implications for macroeconomic policy. The 2008-2009 financial crisis was characterised by a synchronised trade collapse in all economies, as the effects of a drop in demand fed through to countries located upstream in the global value chain. A better understanding of value-added trade flows would provide tools for policymakers to identify the transmission of macroeconomic shocks and adopt the right policy responses.

Implications for Trade Negotiations

The fact that trade policies are much more interdependent than in the past suggests that unilateral liberalization is not enough and more emphasis should be put on multilateral trade agreements. When barriers to intermediate inputs are as important as barriers to final goods and services, the exporter policy becomes a determinant of market access and trade policy should not focus only on barriers in the importing economy. Ideally, all countries participating in the value chain should be part of the same trade agreement. While most agreements are now bilateral or regional, companies engaged in GVCs may suffer from heterogeneous trade regimes.

In particular, with the proliferation of regional trade agreements (RTAs), one concern is the costs associated with rules of origin. When these agreements grant tariff preferences, rules of origin are necessary to identify the products of partner countries that should benefit from these preferences. The fragmentation of production challenges the design of effective rules as it becomes difficult to clearly identify the origin of products that incorporate inputs from many different countries within and outside the RTA. The costs supported by firms to prove compliance with the rules of origin are higher. Allowing for full cumulation or relaxing the percentages of non-originating materials can help to make rules of origin more GVC-friendly and to limit their trade-distortive impact.

International trade relies on a logistics chain and several types of measures and policies have an impact on costs. Most of these costs are related to services (transport, insurance, distribution, etc.). Facilitating trade in the value chain requires efficient services markets. Non-tariff measures on services affect trade in goods in addition to trade in services and more emphasis should be put on services trade liberalization to promote efficiency gains in the value chain. The literature also points out the importance of standards. With the elimination of quotas and reduction in tariffs, meeting standards on products or processes becomes the main challenge for companies entering new markets, especially in high-income countries. Some of these standards are put in place by governments but a specificity of GVCs is the growing importance of private

standards. GVCs are led by global buyers and global suppliers that set the standards for smaller scale producers. These private standards can become trade barriers if they are used to exclude competitors, but they can also play a positive role in promoting efficiency along the value chain and facilitating cooperation between buyers and suppliers. These are new issues for trade negotiators.

Challenges Ahead

Given the importance of the subject, the OECD and WTO will be looking to engage more closely with their networks of official statistics institutes and other international organizations in the coming years in order to attempt to mainstream the production of trade in value-added statistics, such that their quality can be considered in the same light as other official statistics. Both the OECD and WTO have strong networks in the area of trade policy and can therefore provide the proper institutional environment to maintain and expand the existing network of experts and projects working on this subject, and channel the results and their policy implications to the most appropriate international forums.

Clearly the key technical challenges in the immediate future concern the quality of trade statistics and the assumptions made to allocate imports to users (industries/consumers). In addition, there are a number of issues that arise from the recent revision to the System of National Accounts (2008 SNA) and Balance of Payments Manual (BPM6) which provide the underlying basis for international trade transactions and indeed those recorded in input-output tables. Chief amongst these concerns are changes made to the recording of “goods sent abroad for processing” and “merchandise”. But other important changes have been made too, such as the recognition that “research and development” expenditures should be recorded as investment, which directly changes value-added. Indeed the recognition of R&D as investment shines a spotlight on other intellectual property products and on the importance of flows of income as opposed to only value-added. Again the institutional networks of the OECD and its partner international organizations in the international statistics community are well placed to provide an umbrella for these issues to be further developed.

Finally, a crucial practical challenge is communicating pertinent output concerning trade in value-added in ways that are easily understood and interpreted by policymakers in general — and trade negotiators in particular — as well as non I-O practitioners in general (including economic researchers and journalists). Meaningful trade in value added statistics and indicators should be presented in simple, unambiguous terms whether via summary tables or graphical output – the latter possibly exploiting recent advances in software for producing “dynamic” graphs for online visualization. Significant efforts to develop robust indicators of international trade in value-added should be accompanied by effective communication to target audiences.

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