

# Value creation in exports

## A diagnosis for Belgium

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### Introduction

An economy's external competitiveness is generally assessed by the scale of its exports of goods and services. Foreign sales in fact provide a yardstick for measuring the desirability of domestic production, since they are less protected by possible economic or administrative barriers than on the domestic market. From a macroeconomic angle, exports of goods and services are vitally important. As the counterpart to imports which are often essential in the absence of a full range of commodities, exports support the current account balance, where a deficit cannot be sustained in the long term. They also act as a growth catalyst by offering the opportunity to exploit untapped foreign demand, particularly in emerging countries. It is therefore natural to find statistics on exports of goods and services on the list of indicators frequently used to assess an economy's competitiveness. The European Commission included them in its scoreboard for monitoring macroeconomic imbalances, and international institutions in general use them as an assessment tool in their country studies<sup>(1)</sup>.

Although the export basket formerly comprised goods and services which were largely produced by the exporting country, that is less the case today. For one thing, it has become more common for goods to be re-exported, partly as a result of the development of international trade routes, with sea ports as the dominant hubs. Also, production processes increasingly involve imported inputs, notably energy products and commodities, which are an integral economic component of exports, even if they undergo physical processing. Ultimately, exports incorporate prior imports, which have to be disregarded if the aim is to identify the true source of income and employment for an economy, namely exported value added.

The purpose of this article is to introduce the exported value added approach (Johnson, 2014, Johnson and Noguera, 2012a, Johnson and Noguera, 2014, Koopman *et al.*, 2014)<sup>(2)</sup> and present the main findings for Belgium. While this approach does have its limitations, such as the uncertainty surrounding some data or the significant delay in data availability, it nevertheless enriches the diagnosis of external competitiveness traditionally based on statistics on exports of goods and services, thus shedding new light on the degree of openness of an economy, the loss of market shares, trading partners, the branches of the economy involved in exports, and the trade balance.

### 1. Sources used

The main source used for this article is the input-output matrix, known as the input-output table. It gives a detailed description of the production process and transactions between the economy's branches of activity. Published every five years, Belgium's input-output matrix is available for the year 2010 with a breakdown into 64 branches of activity<sup>(3)</sup>. To ascertain all Belgium's connections with the rest of the world, the article also uses the data from the global input-output matrix called TiVA, compiled by the WTO and the OECD<sup>(4)</sup>. Broken down into 18 branches of activity, it covers 57 countries

(\*) The author would like to thank C. Swartenbroekx, L. Dresse and F. Caruso for their advice.

(1) See in particular EC (2013), EC (2014), IMF (2013), IMF (2014) and OECD (2013).

(2) See Amador and Cabral (2014) for an overview of the literature on the subject.

(3) For more information, see FPB (2013). A matrix in the same format is also available on Eurostat for other European countries.

(4) For more information, see OECD-WTO (2012).

and, for the purposes of this article, relates to the period 1995-2008<sup>(1)</sup>.

The great advantage of the input-output matrices is that, by describing the purchases and sales of the branches of activity and the remuneration of the production factors, they make it possible to identify the origin of the value creation. The method used for that purpose is based on the classic analysis of the Leontief inverse matrix<sup>(2)</sup>. Sometimes also known as the cumulative cost method, it is regularly used for economic analysis, including for Belgium (Avonds, 2013a, 2013b). However, as far as we know, this article is the first to draw the initial lessons for the diagnosis of Belgium's external competitiveness.

Nevertheless, there are limits to the use of the input-output matrices. First, there is a significant delay, ranging between three and five years, before the data become available. Moreover, the TiVA global input-output matrix does not comprise official statistics. It has not been validated by national statistical institutes, so the possibility of inconsistencies cannot be ruled out<sup>(3)</sup>. Finally, it should be remembered that the use of an input-output matrix for analysis purposes is based on a fundamental assumption of the homogeneity of branches of activity<sup>(4)</sup>. Production units within the same branch of activity are assumed to have the same productivity and produce the same goods or the same service, as the case may be, with constant returns to scale<sup>(5)</sup>.

## 2. Exports of goods and services: from the traditional concept to the value added concept

The global economy has seen a proliferation of exports of goods and services (G&S). These exports have grown at a faster pace than economic activity (Jacks *et al.*, 2011) to the point where they exceed output in some countries. This surprising finding is due to various phenomena which can be captured by the concept of the import content, or in other words the foreign value of exports.

(1) The data for 2009, which are also available, were disregarded because they were greatly affected by the economic crisis. Moreover, the 2009 data for Belgium could not be clearly validated by checking with the aid of NAI data.

(2) For a formal presentation of the method applied to exports, see in particular Koopman *et al.* (2012) and Avonds (2013b).

(3) To compile a global input-output matrix it is usually necessary to introduce adjustments to official statistics, as the data from the various countries are not always consistent: exports recorded by country A intended for country B do not always correspond to the imports from country A recorded by country B.

(4) This limit applies mainly to the global input-output matrix. In the Belgian input-output matrix, the branches of activity are homogenised in that secondary output is reallocated to the branch of activity concerned (FPB, 2013).

(5) However, research has shown that, within the same branch of activity, export firms are generally more productive than non-exporters (see in particular Bernard *et al.*, 2003, for the United States, Eaton *et al.*, 2004, for France, and Muÿls and Pisu, 2007, for Belgium).

(6) See WTO (2013).

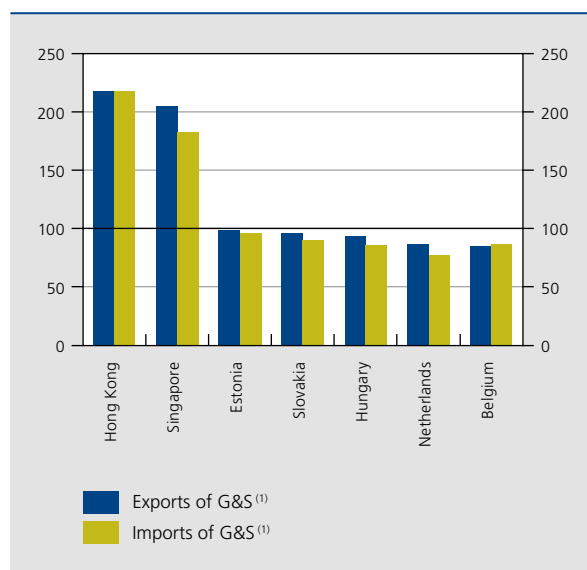
(7) For more information on the role of multinationals in foreign trade, see Bernard *et al.* (2010).

The first wave of foreign trade expansion occurred in the late 19th century, driven by the fall in transport costs and the lowering of customs barriers<sup>(6)</sup>. Against the backdrop of industrialisation which favoured the concentration of production units in western countries, the latter became major exporters of goods and, at the same time, major importers of the commodities required for the manufacturing processes.

Since 1970, the emergence of information and communication technologies and the reduction of political and economic barriers in the emerging countries have generated a second wave of international trade expansion. At the heart of this development, multinational companies<sup>(7)</sup> have made maximum use of the scope for boosting their production efficiency by improving their cost control via the (re)location of certain phases of production in low-wage countries or countries with less stringent tax, social and environmental laws. By exploiting the comparative advantages offered by each production site, they have participated in ending the partitioning of production lines, which have become broken down into a succession of links in the chain, sometimes spread across several countries.

Nowadays, a country's firms very rarely produce their goods and services purely from domestic resources. Whether their output is destined for the home market or the foreign market, the production process uses imported inputs such

**CHART 1** EXPORTS AND IMPORTS OF GOODS AND SERVICES  
(in % of GDP)



Source: UNCTAD.

(1) According to the balance of payments.

as commodities, and in particular energy products, or other intermediate goods and services. As former WTO Director-General Pascal Lamy<sup>(1)</sup> said: "As recently as 30 years ago, products were assembled in one country, using inputs from that same country. [Now] it is very different. Apple's iPhone illustrates this clearly. It is assembled in China. Yet the components come from numerous countries. It isn't just phones. Automobiles, aircraft, electronics – even clothing – are increasingly made in many countries. Manufacturing is driven by global supply chains, while most imports should be stamped 'made globally'".

From a statistical angle, transfers of inputs between the various countries are always recorded as exports. Moreover, some countries are located at the crossroads of trade routes and act as a link between the supplier countries and the countries of destination. Goods entering a country and leaving without undergoing any processing – referred to as re-exports – inflate the export statistics<sup>(2)</sup>. At global level, that has an amplifying effect because the same product is exported by several countries in succession. Re-exports of goods are particularly substantial in countries which have

an international sea port. That is why re-export is sometimes called a "port effect". Hong Kong and Singapore, which serve as entry and exit ports for the south-east Asian market, experience this on a large scale, as do Belgium and the Netherlands which serve the north European market. Other countries which are also located along trade routes, such as Estonia, Slovakia and Hungary, are all three major re-exporters of machinery and transport equipment.

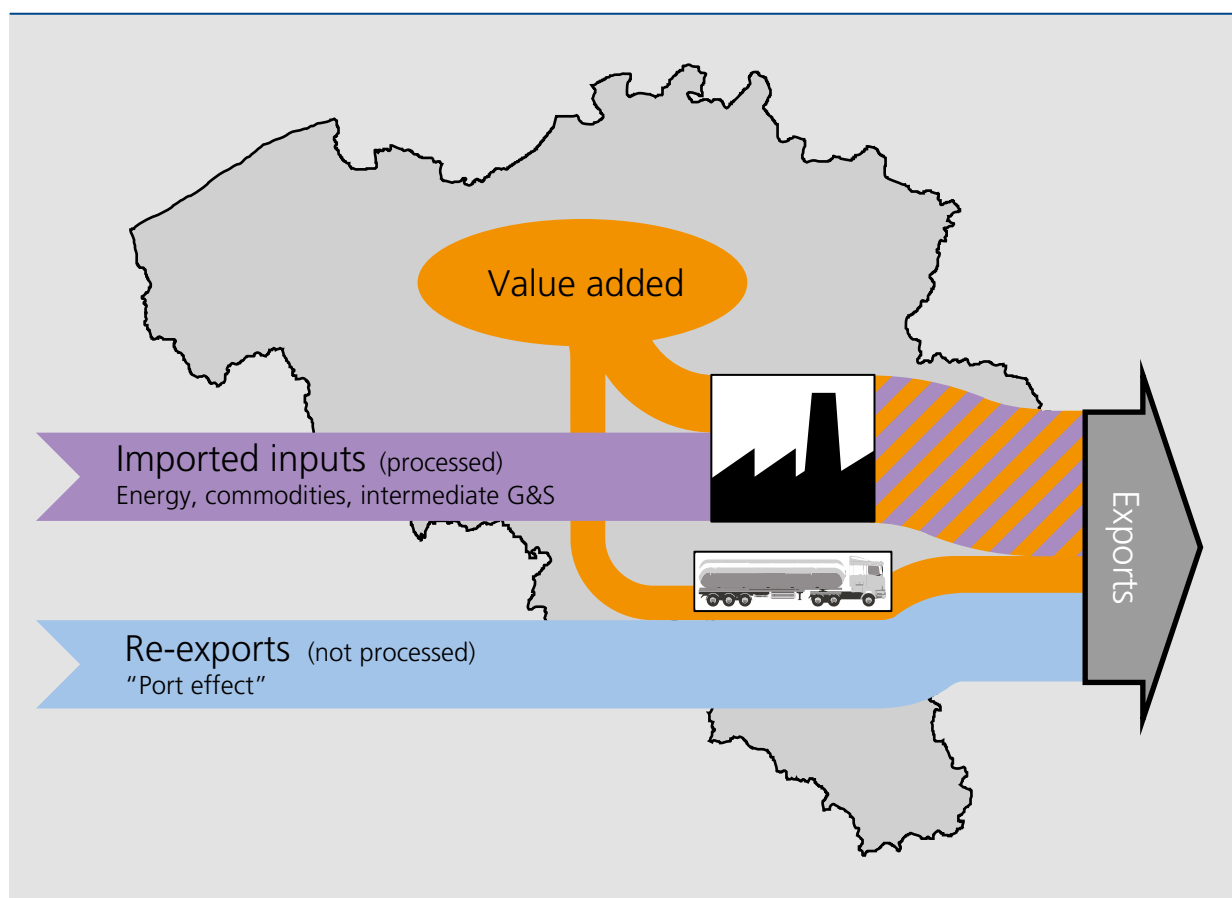
Re-exports and imported inputs together make up the total foreign value of exports<sup>(3)</sup>, because they were previously imported. Although it may no longer necessarily be possible to distinguish the imported inputs, as they have been incorporated during the production processes, in economic terms they form an integral part of exported

(1) Financial Times, 24 January 2011.

(2) Re-exports differ from transit in that a resident acquires ownership of the goods at the time of the transaction (see NAI-NBB, 2009, 2012). Transit is not recorded in the national accounts data or in the balance of payments or foreign trade figures. However, in Belgium, foreign firms with a Belgian VAT number engage in transit activities. These are recorded in the foreign trade data according to the Community concept but not in those according to the national concept, nor are they recorded in the national accounts.

(3) To be precise, we should refer to foreign value added, not foreign value. However, for simplicity we shall refer to value added only if it is of domestic origin.

CHART 2 BREAKDOWN OF EXPORTS OF GOODS AND SERVICES



Source: NBB.

goods and services. By deducting the foreign value content of exports, we find the exported value added (VA)<sup>(1)</sup>. From the economic point of view, that measures the real value creation of exports, by remunerating the domestic production factors involved directly or indirectly in the production of goods and services for export. In the case of re-exports which are sold on without processing, the exported VA corresponds to any difference between the buying price and the selling price, encompassing the trade margin and, if appropriate, payment for transport and logistic services provided in the country concerned.

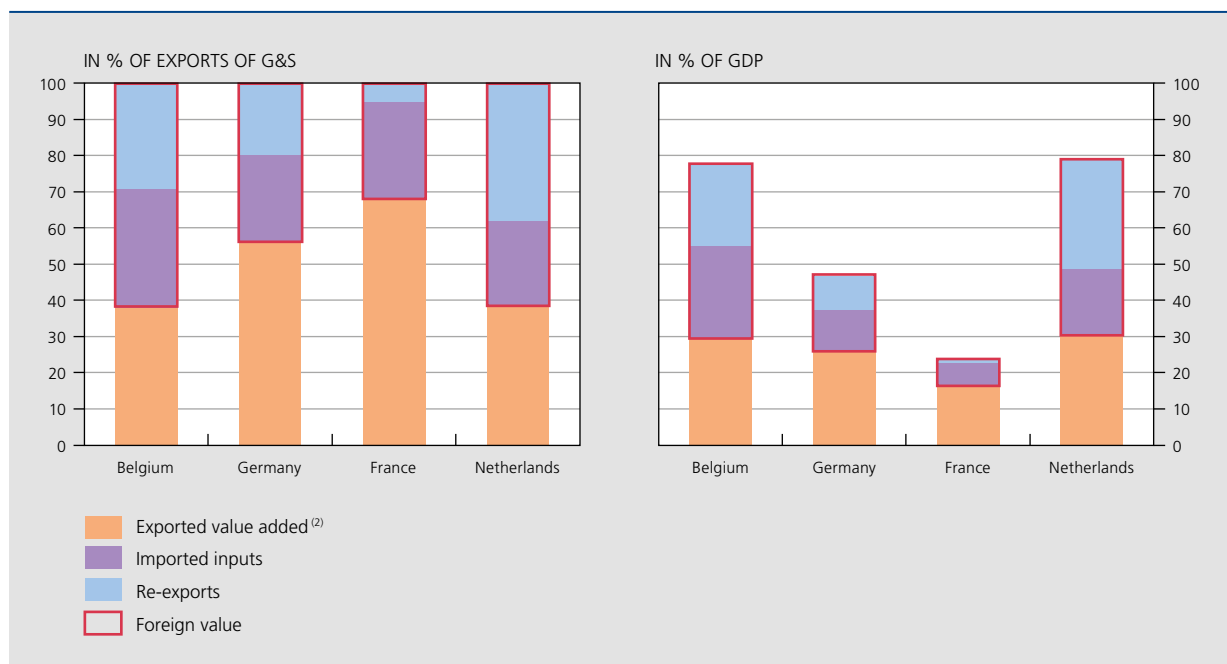
In practice, the exported VA may be generated in various stages via a fragmented production process. The values are therefore established on a cumulative basis. A simple example can illustrate this mechanism. Say a Belgian firm processes imported inputs (cocoa beans) to make intermediate goods (cocoa paste), then sells them to another Belgian firm that in turn processes them into an end product for export (chocolate), by incorporating other imported inputs (sugar) in its production process<sup>(2)</sup>. In this example, the exported VA corresponds to the sum of the VA created by each of the two domestic firms<sup>(3)</sup>. From a macroeconomic point of view, it is obtained simply by taking the income from the sale of exported chocolate and deducting the imported inputs, i.e. the

sum of the invoices for cocoa beans and sugar. The macroeconomic approach has the great advantage of highlighting relevant economic information while avoiding the tedious job of tracing each of the intermediate inputs used in each successive stage in the production of each of the exported goods and services (see De Backer and Miroudot, 2013).

In Belgium, an export amounting to € 100 in 2010 generated income of € 38 on average, because it entailed prior foreign purchases amounting to € 62, of which € 29 represented goods for re-export and € 33 represented imported inputs incorporated in the production process. These figures for the foreign value of exports are comparable to those for the Netherlands, which shares the same characteristics in terms of size and geographical location<sup>(4)</sup>, but they are much higher than for Germany or France.

- (1) The term is used by analogy with the concept applied at firm level, as a firm is said to create VA if the selling price of its product exceeds the price of the intermediate consumption, namely the goods and services bought to make the product.
- (2) Imported inputs are incorporated at each production stage since energy is generally necessary (for heating, transport, etc.).
- (3) In this case, the exported VA = (price of cocoa paste – price of cocoa beans) + (price of chocolate – price of cocoa paste – price of sugar) = price of chocolate – price of cocoa beans – price of sugar.
- (4) According to Baldwin and Lopez-Gonzalez (2013), another determinant is the proximity to Germany, which is one of the three global clusters.

**CHART 3** RELATIVE SHARES OF THE THREE COMPONENTS OF EXPORTS OF GOODS AND SERVICES<sup>(1)</sup>  
(2010)



Source: NBB calculations based on EC data.  
 (1) According to the national accounts, excluding consumption by non-residents in the country.  
 (2) Including taxes net of product subsidies.

### 3. External competitiveness from the value added angle

As we shall see, the breakdown of exports into value added and foreign value usefully complements the traditional view of external competitiveness based on goods and services export statistics. By excluding the foreign value content, the analysis of exported value added sheds new light on the various concepts, including the degree of openness, market shares, identification of the branches of the economy involved in export, trading partners and the trade balance.

#### 3.1 A new look at the degree of openness

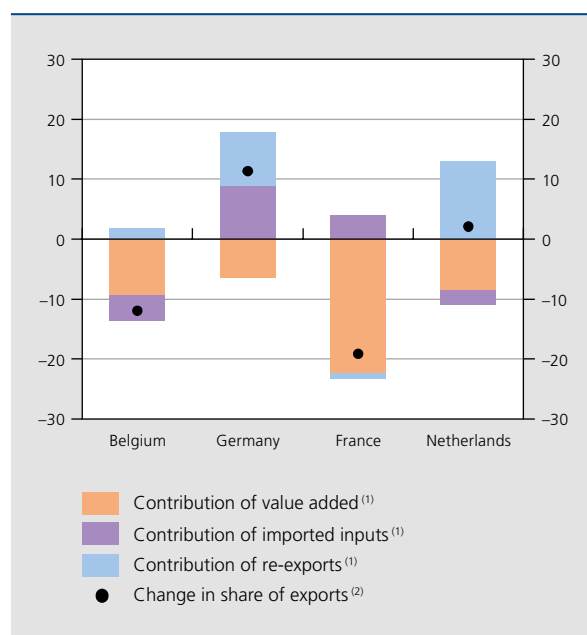
While the degree of openness is traditionally defined as the ratio between exports of goods and services and GDP, it can be assessed by taking exported VA as the numerator. According to this new criterion, the degree of openness in Belgium came to almost 30 % of GDP in 2010<sup>(1)</sup>, comparable to the figure for the Netherlands and, to a lesser extent, Germany. In comparison with the 80 % figure traditionally used, based on data on exports of goods and services, this degree of openness is relevant in various respects. It links two conceptually identical variables, namely exported VA and GDP, which is the same as total VA<sup>(2)</sup>. It therefore offers an economic interpretation of the residual share, namely 70 % of GDP, which represents the creation of value in Belgium consumed or invested within the country's borders.

The degree of openness based on exported VA also offers a relevant measure of the real economic weight of exports. Excluding the foreign value of exports in fact permits identification of the amount generating income and employment for the economy. In general, exported VA is created by two production factors, namely labour and capital, which are mobilised directly by export firms or indirectly by their suppliers. In 2010, the remuneration of employees involved in production destined ultimately for export was equivalent to 16 % of GDP, compared to 13 % for the gross operating surplus<sup>(3)</sup> of the corresponding activities. In terms of jobs, 29 % of the 4.5 million Belgian workers were directly or indirectly employed in exports.

As is evident from chart 8 in section 3.5, the degree of openness measured from the point of view of exported VA hardly varied between 1995 and 2010, hovering around 30 % of GDP. Conversely, the ratio based on exports of goods and services has risen from 65 % to 80 % of GDP since 1995. However, this rise was due only to accelerating re-exports and increased use of imported inputs in export-oriented production processes.

**CHART 4** CHANGE IN EXPORT SHARES IN OECD COUNTRIES AS A WHOLE

(changes in total exports of goods and services of OECD countries between 1995 and 2008)



Source: NBB calculations based on OECD data.

- (1) For country *i*, the contribution of component *C<sub>i</sub>* (*C* = value added, imported inputs or re-exports) of exports *X<sub>i</sub>* equals  $(C_i^{08}/X_i^{08}) * (X_{OECD}^{95}/X_{OECD}^{08}) - (C_i^{95}/X_i^{95})$ . The contribution of exported value added includes taxes less subsidies on products.
- (2) In value, according to the national accounts.

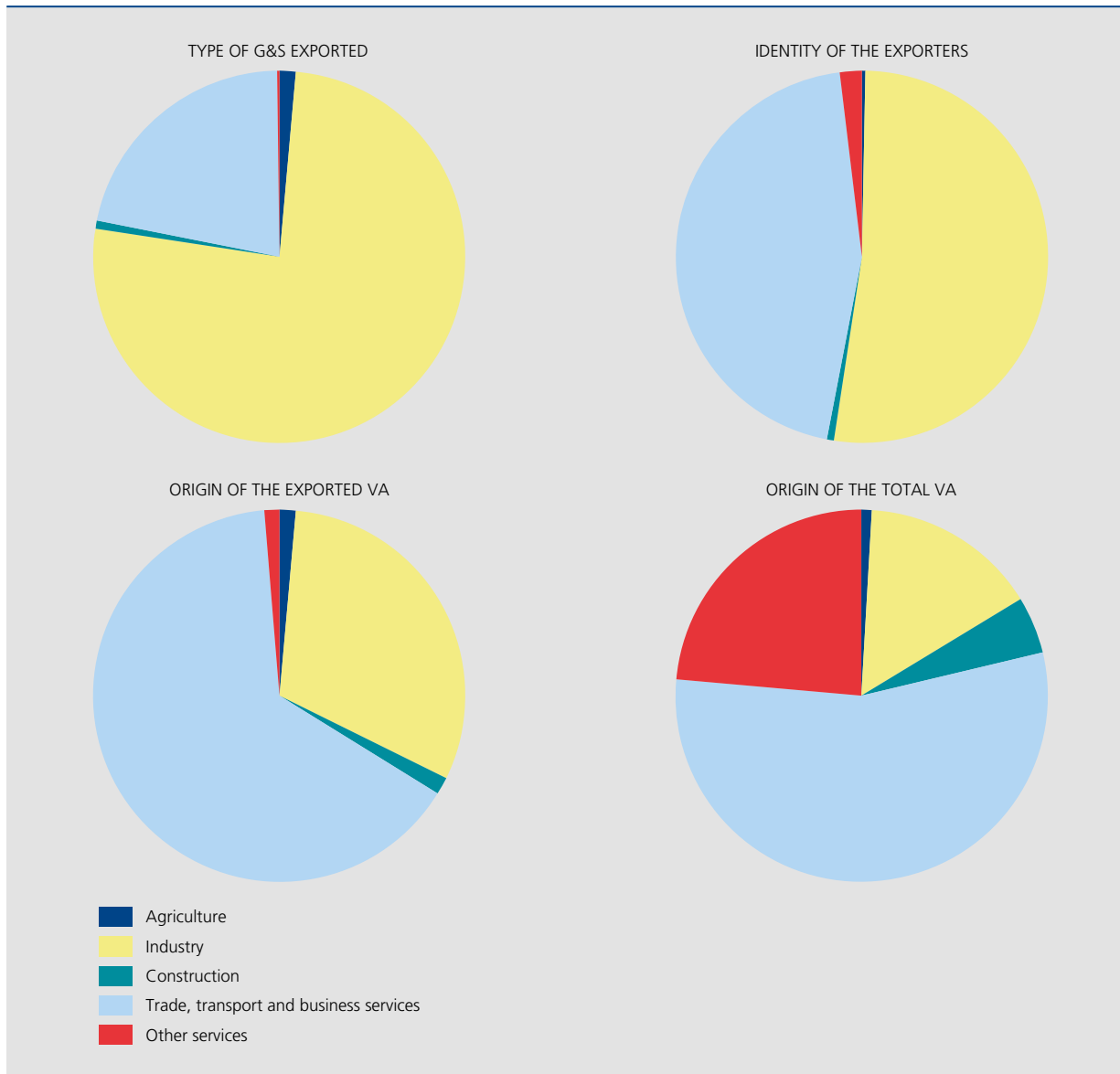
#### 3.2 A new look at the loss of market shares

External performance is traditionally assessed according to export market shares. Although there are divergences between the various possible methods of calculation or the statistical sources used<sup>(4)</sup>, they all indicate that Belgium is tending to suffer much greater losses of market shares than Germany or the Netherlands. Belgium's share in exports of goods and services of all OECD member countries, measured in value according to the national accounts, was thus down by 12 % between 1995 and 2008. Over the same period, Germany and the Netherlands respectively gained 11 % and 2 % in market shares, while France lost 19 %.

Since changes in market shares are calculated on the basis of export statistics, they are influenced by changes in the foreign value content of exports. If that content increases, a rise in exports may be entirely consistent

- (1) Exported VA includes taxes less subsidies on products.
- (2) Plus taxes less subsidies on products.
- (3) Including gross mixed income, i.e. the remuneration of self-employed persons.
- (4) Market shares may be obtained by comparing a country's exports with the exports of a group of countries or the imports of a group of partner countries, in value or in volume. The national accounts, balance of payments and foreign trade are all potential statistical sources.

**CHART 5**      **ROLE OF THE BRANCHES OF ACTIVITY IN EXPORTS OF GOODS AND SERVICES**  
(2010)



Source : NBB calculations based on NAI data.

with a fall in exported VA, as in the case of a firm whose increased turnover masks a decline in profits. The growth of re-exports in the Netherlands combined with greater use of imported inputs in Germany inflated the exports of those two countries between 1995 and 2008. Conversely, Belgium's export performance did not feature a positive contribution from foreign value. Therefore, if the latter is excluded and the focus is solely on the contribution of exported value added, it seems that Belgium's export performance lags behind that of Germany and the Netherlands to a much smaller degree than if it is assessed on the basis of the goods and services export statistics.

In general, the negative contribution of imported inputs to Belgium's exports could be due to greater use of domestic inputs. However, in view of the high imported input content of Belgian exports, that is not the case, and Belgium is therefore not isolated from global production chains. That negative contribution is probably due more to catching up on the part of the other OECD countries. Compared to their situation in 1995, they include more imported inputs in their export-oriented production processes. However, in terms of level, most of them are less integrated than Belgium.

### 3.3 A new look at the branches of the economy involved in exports

By examining the branches of the economy involved in exports, it is possible to refine the analysis of exported VA. For that purpose, we shall look at the types of goods and services exported, the identity of the exporters – namely the branches of activity to which export firms belong – and finally the identity of the creators of exported VA – i.e. the branches of activity which have played the biggest part, be it directly or indirectly, in the export production process.

The share of goods in foreign trade, namely around 80 %, was long attributed to industry. Services, which make up the remaining 20 %, were naturally allocated to the market services branches of activity. However, these orders of magnitude are not validated by the statistics currently available. Thus, of the total amount of goods and services exported by Belgium, the share to be credited to industrial firms was 52 % in 2010, compared to 47 % for firms classified in the service branches<sup>(1)</sup>. Taking exports of goods on their own, the share of service companies already came to 35 %. In that regard, the explanation lies in the role that many service companies play as intermediaries. Sometimes they engage in the re-export of goods

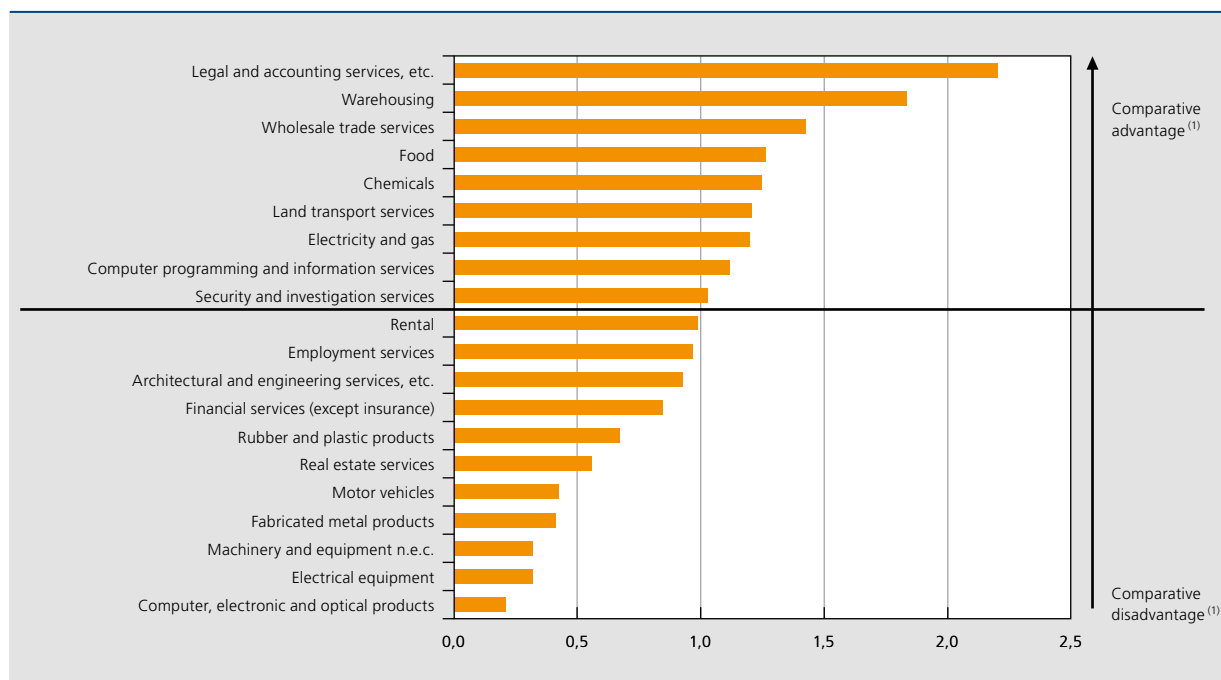
transiting via Belgium, particularly through the port of Antwerp, and sometimes they form a link in the export chain for goods made by Belgian industrial firms.

The exporter's identity does not necessarily provide relevant economic information. In a context of fragmented production and distribution chains, the value of exported goods and services is generally created by various companies, each involved at successive stages in the production process. As illustrated by the chart 10 in the annex, the many economic links between branches of activity bear witness to the complexity of that process. The export contribution of each branch of activity can be assessed according to their respective contributions to the process of producing the exported goods and services. A breakdown of the total amount of VA exported by Belgium according to the branch of activity of origin reveals that the creation of export value is attributable mainly to the service branches, at 66 %, against 31 % for industry.

Service firms naturally create VA by producing services for export. However, an examination of the industrial goods production process shows that the value that the goods

(1) The remaining 1 % is attributable to agriculture and construction.

**CHART 6** BELGIUM'S REVEALED COMPARATIVE ADVANTAGES  
(in relation to the three neighbouring countries, 2010)



Source: EC.

(1) Share of exported VA created by each branch in total VA exported by Belgium, standardised in relation to the three neighbouring countries. An index higher (lower) than 1 indicates a comparative advantage (disadvantage), as the share of the branch in exported VA is bigger (smaller) in Belgium than in the three neighbouring countries.



acquire is also attributable partly to the service branches. An analysis of intermediate consumption reveals that between 1980 and 2010 the contribution of service firms increased from 14 % to 31 % of the total VA exported in the form of industrial products. Admittedly, part of that rise is due to a shift towards service activities, something which is more an accounting matter<sup>(1)</sup>. Thus, goods are sometimes exported by branches of industrial groups classified in the service sector, whose exported VA is inflated by the trade margins achieved. However, another reason for this development is that industrial firms are reverting to their core business. In that respect, industrial firms are now increasingly outsourcing service activities relating to industrial activity, such as legal, accounting, financial and transport services.

From a macroeconomic angle, the key role performed by service branches in export activities does to some extent resolve the paradox whereby goods account for the major part of foreign trade whereas service activities predominate in the economy<sup>(2)</sup>. The analysis from the value creation perspective in fact shows that the service branches are of

crucial importance to external competitiveness. However, that only applies to market services. Non-market services are still almost exclusively domestic activities, as is construction.

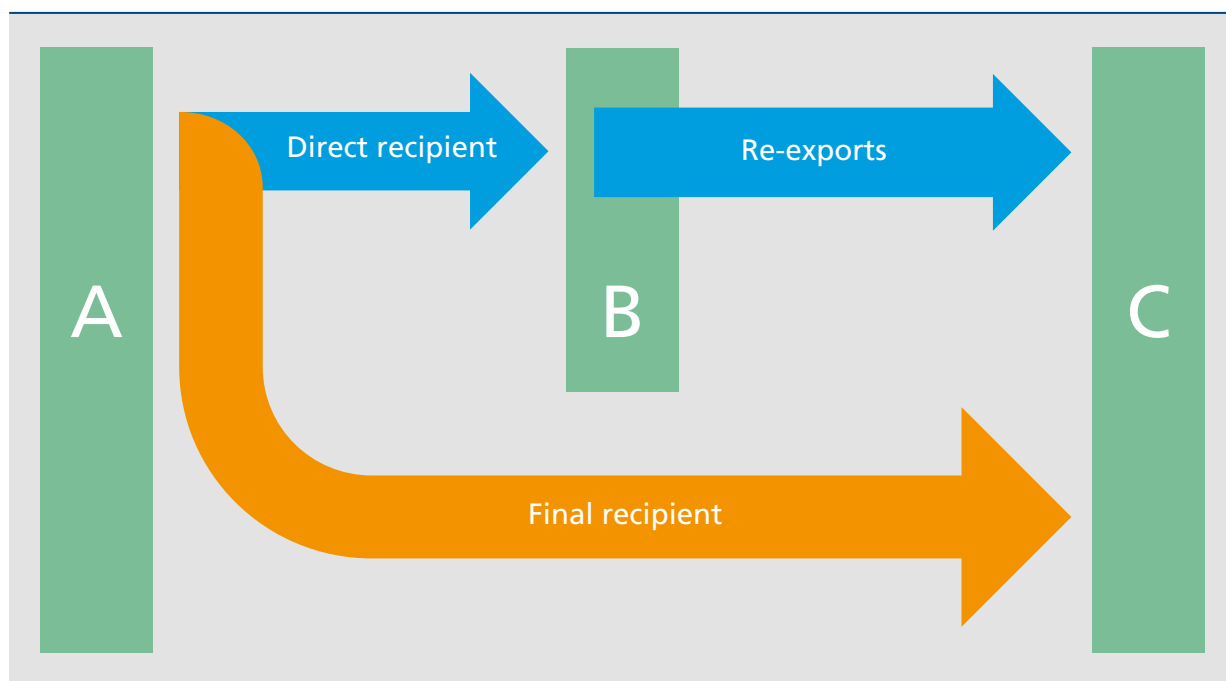
Belgium has a revealed comparative advantage for a number of market services in the 20 main branches of activity out of the 64 in the breakdown. Compared to the three neighbouring countries, the contributions to the exported VA of legal and accounting services, warehousing and the wholesale trade services are relatively high. Apart from certain services, Belgium also has a revealed comparative advantage in food and chemical branches. Conversely, a comparative disadvantage is evident in a large number of manufacturing industries, such as computer products, electrical equipment, machinery and equipment, fabricated metal products and motor vehicles.

### 3.4 A new look at the geography of foreign trade

The traditional approach to foreign trade identifies the direct recipient of the exports<sup>(3)</sup>. But exports to one country may in turn be rerouted to a third country, possibly after processing. The final recipient of the exports, and hence of the exported VA which they contain, may therefore differ from the direct recipient<sup>(4)</sup>. Similarly, traditional import

(1) This applies in particular to employment services (classified in the service branches), which include agency work, notably that allocated to industry.  
 (2) See Duprez and Dresse (2013).  
 (3) Foreign trade and the balance of payments provide a geographical breakdown of imports and exports respectively for goods and services.  
 (4) The exporting country may itself be the final recipient if it re-imports the products or services sent abroad for processing. According to the OECD data, however, the amounts are very small in the case of Belgium.

CHART 7 DIRECT RECIPIENT VERSUS FINAL RECIPIENT: AN EXAMPLE



Source : NBB based on WTO (2013).



**TABLE 1** BELGIUM'S TRADING PARTNERS  
(2008, in % unless otherwise stated)

	G&S exports		G&S imports	
	Final recipient	Direct recipient (G) <sup>(1)</sup>	Origin of the value	Direct supplier (G) <sup>(1)</sup>
EU .....	59.3	75.5	60.7	74.3
Germany .....	9.1	17.1	13.5	16.1
France .....	13.2	17.5	12.4	12.4
Netherlands .....	5.6	13.5	9.5	24.3
United Kingdom .....	8.2	6.9	6.7	6.4
United States .....	9.9	3.8	8.2	4.1
BRICS .....	8.5	5.7	10.4	7.1
Average distance <sup>(2)</sup> (km) .....	2 943	1 846	2 841	2 037

Sources: OECD, NAI.

(1) Data for goods only, according to foreign trade in national concept.

(2) Bilateral distances measured according to the geographical distribution of the population (Mayer and Zignago, 2011) were weighted according to the geographical distribution of exports and imports.

data identify the direct supplier, yet the true origin may be quite different as the supplier may have previously imported the goods and services.

For many production lines, a country is just one of many links in the chain. In general, the value of the goods and services consumed by the final recipient can be subdivided into value content created successively by each country participating in the production process<sup>(1)</sup>. This determines the geographical origin of the value, as well as the place of final consumption.

Comparison of the map of Belgium's trading partners according to the traditional approach and according to the VA perspective sheds new light on the subject. In 2008, the EU consumed almost 60% of the VA exported by Belgium, whereas its share in Belgian exports of goods exceeded 75%. There are two factors which may explain this finding, which applies in particular to Germany and the Netherlands. First, neighbouring countries predominate as recipients of Belgian re-exports, in which the VA content is by definition relatively small. Also, they use goods and services from Belgium as inputs in their own production destined for export. The Netherlands and, to a greater extent, Germany may be the next link in a chain

that ultimately ends elsewhere. Thus, on average, Belgian exports have travelled almost 1 850 km before reaching their direct recipient, whereas final consumption takes place on average almost 3 000 km away<sup>(2)</sup>.

In the case of imports, the foreign value has also been created at a much greater distance, on average, than the distance between Belgium and its direct suppliers. For example, energy imported into Belgium via the Netherlands inflates that supplier's importance in the import data.

### 3.5 A new look at imports and the trade balance

Apart from their role in exports, imports also meet domestic demand. Examining them from the value added perspective is similarly instructive as it was in the case of exports. Direct inputs and absorbed imported inputs – i.e. 'absorbed' inputs as opposed to imported inputs destined for exports – constitute the foreign value finally consumed in Belgium<sup>(3)</sup>. Unlike direct imports, which are consumed without further processing, absorbed imported inputs – i.e. commodities such as energy or even other intermediate goods and services – are used in the process of producing goods and services for the domestic market.

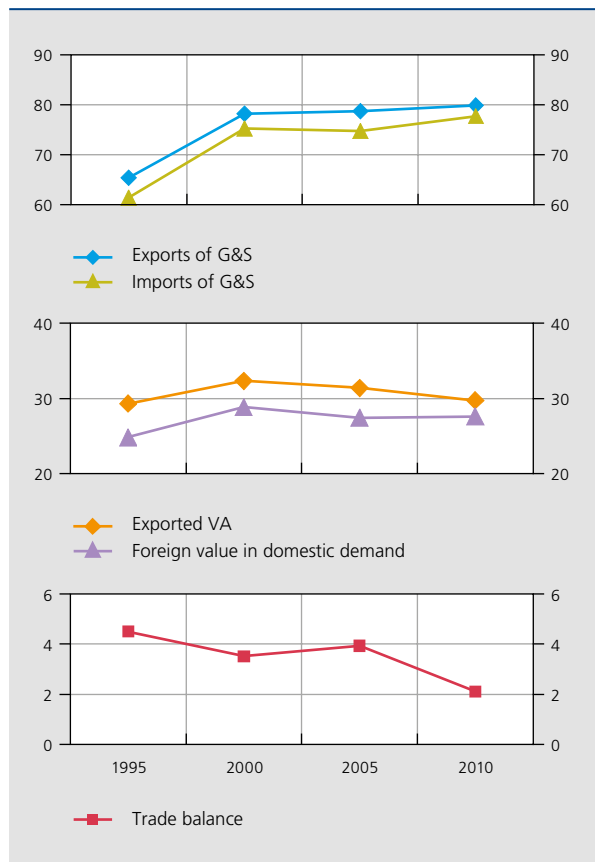
By analogy with the representation of exports in chart 2, domestic demand can also be subdivided into three components, namely absorbed value added, absorbed imported inputs, and direct imports, the latter taking

(1) Timmer *et al.* (2014) go further by calculating the respective contributions of each country's labour and capital.

(2) These are distances taken from the database compiled by the CEPII. They take account of the distribution of the population over the territory (Mayer and Zignago, 2011). It should also be noted that, according to Johnson and Noguera (2012b), the distance that exports travel has declined over the years. However, examination of the data for Belgium did not confirm that finding.

(3) Consumption is meant in the broad sense here, including gross fixed capital formation and changes in inventories.

**CHART 8** DETERIORATION IN BELGIUM'S TRADE BALANCE  
(in % of GDP)



Sources: NAI, NBB calculations.

the place of re-exports in the diagram. The absorbed VA measures the value generated during production for the home market. Part of it also comes from the trade and transport margins achieved in the routing or distribution of direct imports around the country. Absorbed VA supplements exported VA as an additional source of income for the economy.

In Belgium, the absorbed VA content varies from one domestic demand aggregate to another. While government consumption is dominated by Belgian VA, namely 88 % in 2010, household consumption and gross fixed capital formation, in which the VA content amounts to 71 % and 64 % respectively, have a higher proportion of foreign value. In total, 72 % of Belgian domestic demand as a whole is supplied by Belgian VA, as opposed to 28 % for foreign value. For comparison, with a Belgian VA content of only 38 %, exports have a much higher proportion of foreign value.

If exports and imports of goods and services are compared, the difference equals the trade balance. If the

value added approach is adopted, the trade balance can be rewritten as follows:

$$\begin{aligned} \text{Trade balance} &= \text{Exports of goods and services} - \text{Imports of goods and services} \\ &= (\text{Exported VA} + \text{foreign value of exports}) - (\text{absorbed foreign value} + \text{foreign value of exports}) \\ &= \text{Exported VA} - \text{absorbed foreign value} \end{aligned}$$

The advantage of this new expression is that, by eliminating the amplifier effect, it neutralises the foreign value of exports that inflates both flows of goods and services. The trade balance is now redefined as the difference between exported VA<sup>(1)</sup> and absorbed foreign value. The first term measures the country's contribution to foreign demand, while the second determines the contribution of foreign countries to domestic demand. In the end, the trade balance expresses an economy's net contribution to foreign demand.

The trade balance is an instrument often used to monitor the economy. In Belgium, its deterioration is the main cause of the downward trend in the current account balance. However, the diagnosis of the forces at work varies according to the approach. If we consider the flows of goods and services, the deterioration in the trade balance appears to be due mainly to the relative growth of imports. Previous studies have shown that to be attributable essentially to the increasing cost of commodities, and more especially energy products, for which Belgium is a net importer<sup>(2)</sup>. For its part, the analysis of value added flows appears to place more emphasis on a decline in exported VA as a percentage of GDP since 2000. Although the analysis is still at a preliminary stage, it seems that the increase in the price of commodities has been kept under control by more rational use of these resources, but that it has weakened some export production lines.

In comparison, France's situation is similar overall to that of Belgium, with exported VA (as a percentage of GDP) declining since 2000. Conversely, Germany and the Netherlands have recorded a rise in their trade balance since 1995. A brief examination from the point of view of value added as a percentage of GDP indicates that Germany has benefited mainly from growth of exported

(1) To be precise, we should use the VA consumed abroad, which does not always correspond to exported VA, since part of the exported VA may be re-imported and ultimately consumed within the country. However, according to the OECD data, the amounts concerned are negligible in Belgium's case.

(2) See in particular NBB (2012).

VA while the Netherlands has gained from a decline in absorbed foreign value.

#### 4. Recent results and conclusions

The value added approach offers new insights into external competitiveness. It is a worthwhile supplement to the analyses previously conducted on the basis of the statistics on imports and exports of goods and services. However, it is no substitute for such analysis, partly because the global matrix data have not been validated by the national statistical institutes, but also because there is a significant time lapse before the data become available.

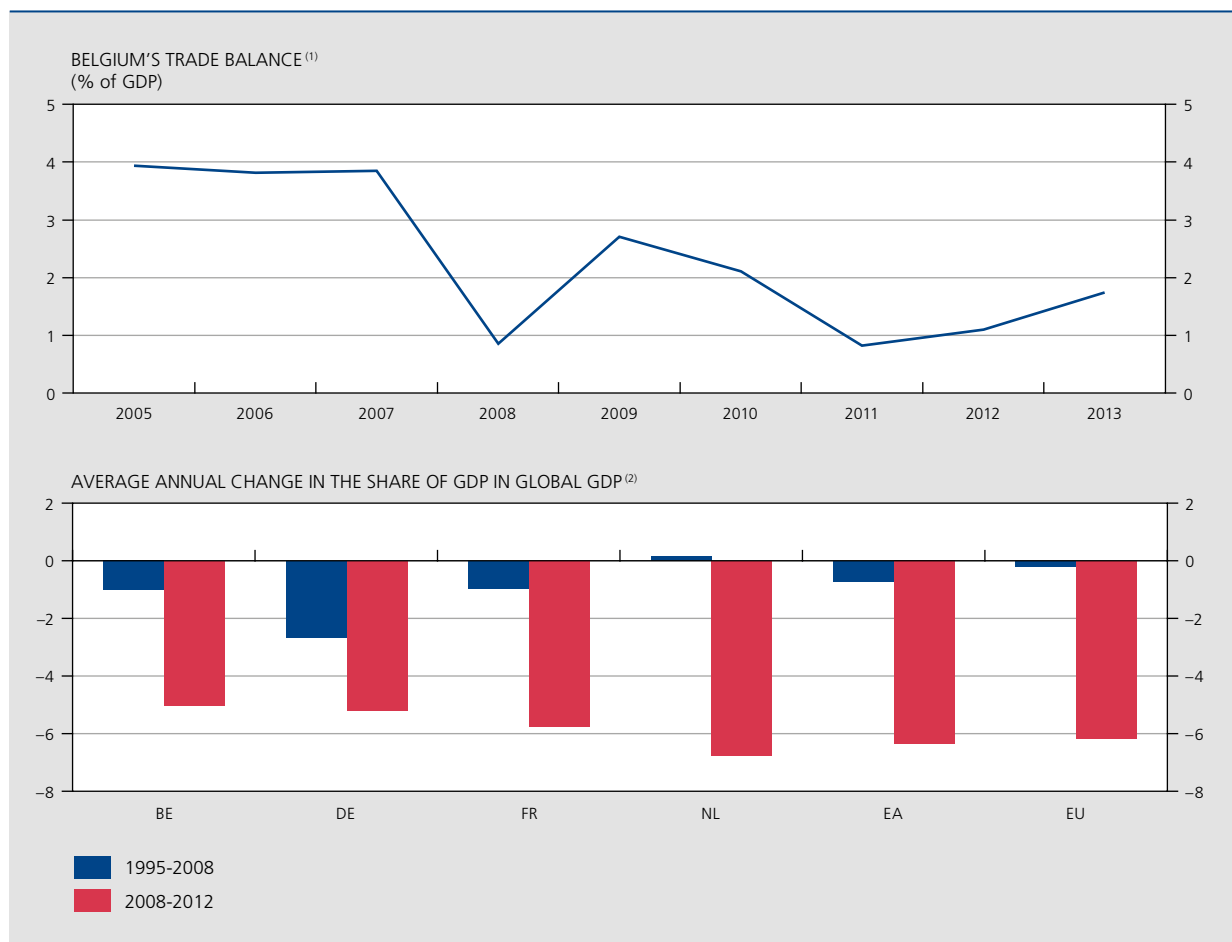
It is difficult to make any definite pronouncement about recent developments, especially as they have taken place in the context of an economic crisis which may have

affected structural trends. Nevertheless, some fragmented information provides a few indications. Belgium's trade balance deteriorated between 2007 and 2013, a deterioration only partly covered by this analysis which extends up to 2010. In general, Europe felt the full force of the economic crisis, as is clear from the marked fall in its share in global GDP between 2008 and 2012. Belgium was no exception, although it does not appear to have suffered more than neighbouring countries.

Although the value added approach set out in this article cannot be used to monitor recent developments, it nevertheless enriches the structural analysis of Belgium's external competitiveness in a number of ways. In particular:

- it improves the definition of the contours of the concept of exports of goods and services, which are statistics that include foreign value. That foreign value creates an amplifier effect which is undesirable in the analysis of an economy's external performance;

**CHART 9** DEVELOPMENTS SINCE THE ECONOMIC CRISIS

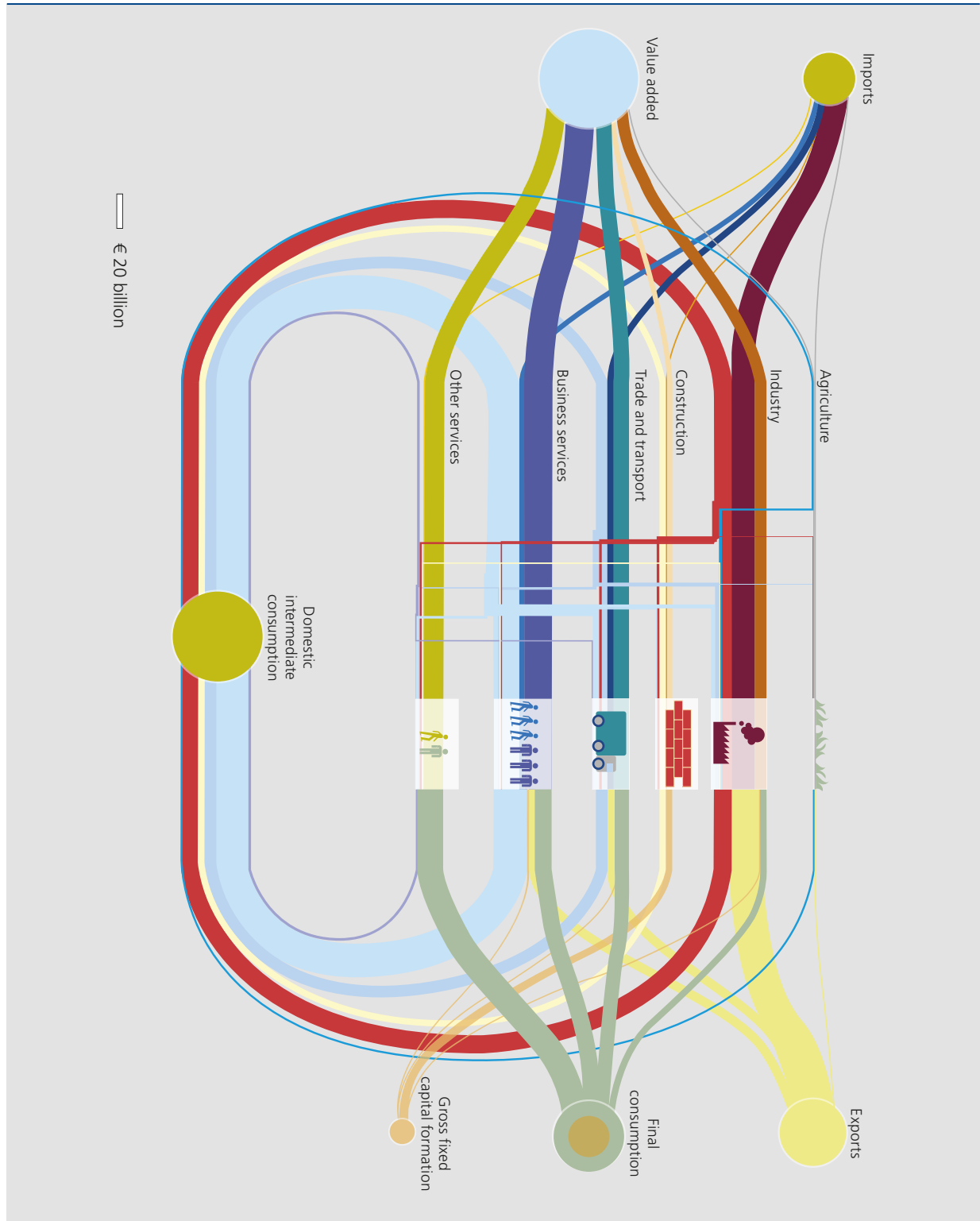


Sources: UNCTAD, NAI.  
 (1) According to the national accounts.  
 (2) Value data.

- it therefore offers an alternative concept to the degree of openness. If this is measured from the exported value added angle, the figure is around 30 % of GDP as opposed to 80 % for the traditional indicator based on exports of goods and services. The difference between these two ratios, almost 50 % of GDP, represents the foreign value of exports which, since it covers import costs, is not a source of income for domestic production factors;
- it qualifies the changes in export market shares recorded between 1995 and 2008. If the contribution of exported value added is considered in isolation, the losses of market share are slightly smaller than if they are calculated on the basis of exports of goods and services. In addition, the gap in relation to Germany and the Netherlands is narrower, as the performance of those two countries is due to the growth of re-exports and foreign inputs;
- it highlights the crucial, albeit sometimes indirect, role of firms belonging to the service branches. While goods account for the bulk of exports, the exporters are in many cases companies in the service sector. Sometimes they re-export goods transiting through Belgium, particularly via the sea ports, and sometimes they act as export links for goods manufactured by Belgian industrial firms. More fundamentally, the exported value added is generated mainly by firms active in the service branches, particularly via the supply of intermediate services to industrial firms;
- it completes the map of trading partners by identifying the true origin of imports and the ultimate destination of exports. The real consumers of the VA exported by Belgium are farther away than the direct recipients of the exports. The three neighbouring countries thus consume less than 30 % of the VA exported by Belgium, whereas they receive almost 50 % of Belgian goods exports;
- it contributes to the examination of the deterioration in the trade balance since 2000. Thus, it seems that the decline in value added exported by Belgium as a percentage of GDP is one of the key factors, although additional analyses are necessary here.

Finally, the value added approach is promising in various respects. It refines our knowledge of external competitiveness and also has the merit of opening up new avenues for analysis and research.

**CHART 10** INTERCONNECTION OF BRANCHES OF ACTIVITY  
(domestic production<sup>(1)</sup>, 2010)



Source : Data visualisation by M. Bogaert based on NAI data.

(1) Changes in inventories, like taxes net of subsidies, are not represented because the corresponding amounts are very small.

## Bibliography

- Amador J. and S. Cabral (2014), *Global value chains: surveying drivers, measures and impacts*, Banco de Portugal, Working papers 3, January.
- Avonds L. (2013a), *De gecumuleerde kosten 1995-2005*, FPB, Working Paper 9, September.
- Avonds L. (2013b), *Bijdrage van de componenten van de finale vraag tot het bbp 1995-2005*, FPB, Working Paper 10, September.
- Baldwin R. and J. Lopez-Gonzales (2013) *Supply-chain trade: a portrait of global patterns and several testable hypotheses*, NBER Working Paper 18957.
- Bernard A., J. Jensen, S. Redding and P. Schott (2010), "Intra-firm trade and product contractibility", *American Economic Review*, 100(2), 444-448.
- Bernard A., J. Jensen and S. Kortum (2003), "Plants and productivity in international trade", *American Economic Review*, 93(4), 1268-1290.
- De Backer K. and S. Miroudot (2013), *Mapping global value chains*, OECD Trade Policy Papers, 159, OECD Publishing.
- Duprez C. and L. Dresse (2013), "The Belgian economy in global value chains – An exploratory analysis", NBB, *Economic Review*, September, 7–22.
- Eaton B., S. Kortum and F. Kramarz (2004), "Dissecting trade: firms, industries, and export destinations", *American Economic Review*, 94(2), 150–154.
- EC (2013), *Macroeconomic imbalances – Belgium*, Occasional Paper 144, April.
- EC (2014), *Macroeconomic imbalances – Belgium*, Occasional Paper 172, March.
- FPB (2013), *Input-output tables 2010*, December.
- IMF (2013), *Belgium: 2013 Article IV Consultation-Staff Report*, IMF country report 13/123, May.
- IMF (2014), *Belgium: 2014 Article IV Consultation-Staff Report*, IMF country report 14/76, March.
- Jacks D., C. Meissner, and D. Novy. (2011) "Trade Booms, Trade Busts, and Trade Costs", *Journal of International Economics*, 83, 185-201.
- Johnson R. (2014), "Five facts about value-added exports and implications for macroeconomics and trade research", *Journal of Economic Perspectives*, 28(2), 119-142.
- Johnson R. and G. Noguera (2012a), "Accounting for intermediates: Production sharing and trade in value added", *Journal of International Economics*, 82(2), 224-236.
- Johnson R. and G. Noguera (2012b), "Proximity and production fragmentation", *American Economic Review: Papers and Proceedings*, 102 (3), 407-411.
- Johnson R. and G. Noguera (2014), *A portrait of trade in value added over four decades*, Working Paper.
- Koopman R., Z. Wang and S.-J. Wei (2014), "Tracing value added and double counting in gross exports", *American Economic Review*, 104(2), 459-494.

Mayer T. and S. Zignago (2011), *Notes on CEPII's distances measures: the GeoDist Database*, CEPII Working Paper 25.

Muûls M. and M. Pisu (2007), *Imports and exports at the level of the firm: evidence from Belgium*, NBB Working Paper 114.

NAI-NBB (2009), *Foreign trade statistics*, Monthly Bulletin (11), 5-31.

NAI-NBB (2012), *Foreign trade statistics*, Monthly Bulletin (06), 5-6.

NBB (2012), *Annual Report*.

NBB (2013), *Annual Report*.

OECD-WTO (2012), *Trade in value added: concepts, methodologies and challenges*, Joint OECD-WTO note.

OECD (2013), *OECD Economic Survey Belgium*, May.

Timmer M., A. Erumban, B. Los, R. Stehrer and G. de Vries (2014), "Slicing up global value chains", *Journal of Economic Perspectives*, 28(2), 99-118.

WTO, Fung Global Institute and Nanyang Technical University (2013), *Global value chains in a changing world*, edited by Elms D. and P. Low.