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HOW DOES FOREIGN DEMAND ACTIVATE DOMESTIC VALUE ADDED? A COMPARISON AMONG THE LARGEST EURO-AREA ECONOMIES

by Rita Cappariello* and Alberto Felettigh*

Abstract

We propose an analysis for the largest euro-area countries (France, Germany, Italy and Spain), based on the framework developed by Koopman et al. (2014) for tracing value added in a country's exports by source and use. We integrate their approach by introducing an additional dimension: the domestic-sector origin of value added embodied in exports. While providing an accurate picture of these countries' participation in global value chains, we estimate the impact on their GDP of a shock to foreign demand and disentangle individual contributions along a geographical dimension in a period running from the introduction of the euro to the beginning of the sovereign debt crisis.

JEL Classification: F14, F15.
Keywords: global value chains, final internal demand, domestic value added activation, trade in value added.

Contents

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1. Introduction[1]

The diffusion of global value chains has deeply changed the way production and trade of goods and services take place. As sequential stages of production ("tasks") are performed at several locations all over the world before assembly into the final product, traditional indicators based on *gross* exports *alone* are no longer reliable as a gauge of the contribution of external final demand to GDP growth in a given country, whether the focus is on global demand or on demand originating from a specific foreign country. The reason is two-fold. On the one hand, as economies engage in processing trade, the domestic-value-added content of a country's exports declines, mirroring an increase in the foreign-value-added content. However, trade statistics record the gross value of goods at each border-crossing rather than the (net) value added between border-crossings. On the other hand, multi-country production networks imply that intermediate goods can travel to their final destination by an indirect route ("triangular" production sharing) making it harder to associate a country's production with the geographical origin of the *final* demand that activated it. For instance, when Italian intermediates are assembled in Germany into final goods to be exported to the US, it is final internal demand in the US that is activating Italian exports (to Germany) of these intermediates and the related content of Italian value added.[2] For all these reasons, global value chains pose intriguing measurement challenges to a full evaluation of an economy's exposure to foreign shocks, both aggregate and idiosyncratic.

Although there is a growing interest in these issues, comparative studies are relatively limited. This paper contributes to filling this gap by focussing on the largest euro-area countries (France, Germany, Italy and Spain); we re-cast the economic international relations of these four countries in value added terms rather than in gross terms. Discrepancies between gross and value added trade flows depend on several characteristics of international production networks; in order to measure them, we apply to WIOD global input-output tables the mathematical framework developed by Koopman, Wang and Wei (2014, henceforth KWW), which traces the value added embodied in a country's exports by source (domestic *vs* foreign) and by geographical origin of the final demand that activated them. WIOD tables match national input-output (supply and use) tables so that the foreign sector in each national table is broken down among partner countries both on the export (use) and on the import (supply) side.

Hummels, Ishii and Yi (2001) was the pioneering attempt at dealing with the measurement issues related to the development of global value chains. They introduced the concept of 'vertical specialisation' proposing to measure it with the foreign content of a country's exports based on national Input-Output tables. However, a country can participate in global value chains not only by using imported inputs to produce exports (international outsourcing), but also by exporting intermediates that are used as inputs by other countries to produce goods for their own exports. Outsourcing is limited to the supply side, whereas globalisation of production is also related to the demand side facing a country's economy. Based on this reasoning, as global input-output tables started being constructed, a later line of research aimed at analysing value added flows from a different perspective, i.e. by considering the origin of the final demand that activates them in a global inter-country input-

[1] We wish to thank Stefano Federico, Arne Nagengast, Roberto Tedeschi, two anonymous referees and seminar participants at the Lisbon CompNet Workshop (September 2014) for comments and suggestions. The views expressed herein are those of the authors and do not necessarily reflect those of Bank of Italy.

[2] Pursuing this line of reasoning, the deduction follows that part of the exports of a country (participating in global value chains) is activated by its own internal demand!

output framework. Johnson and Noguera (2012) and Stehrer, Foster, and de Vries (2012) are two seminal contributions of this "trade in value added" strand of research.

KWW have managed to integrate the literature on vertical specialisation with the literature on trade in value added. They have provided a unified methodology thanks to an accounting identity that dissects a country's gross exports into different components such as exports of domestic value added, re-imported domestic value added, foreign value added and double-counting terms. In particular, the issue of double-counting in gross trade statistics had received little or no attention in the previous literature. KWW have shown that all metrics proposed by the literature on vertical specialisation and the literature on trade in value added can be derived from the KWW framework, in a few instances as special cases of the KWW generalised measures.

In broad terms, our main contribution is to provide a detailed and coherent picture of international production sharing and trade links for the largest euro-area countries in a period spanning from the introduction of the euro to the beginning of the "sovereign debt crisis" in 2011. In particular, we describe the structural features characterising the participation of the main euro-area countries to global value chains, based on a more founded methodology than the ones utilised in previous studies on specific areas or countries (among others Amador et al., 2015, and Iossifov, 2014). More in detail, we break down gross export flows between value added activated by final internal demand around the world and intermediate trade activated by international production sharing processes. We thus provide an estimate of the upward bias that arises when gauging, on the basis of traditional bilateral trade statistics, the impulse of final internal demand within the EU (or the monetary union) on the GDP of the four largest euro-area countries. The strengthening of regional supply chains within Europe explains this bias. Our paper is the first one, to our knowledge, to evaluate euro-area countries' exposure to shocks hitting individual foreign countries by taking into account the interconnectedness of the domestic economy in global value chains.[3]

Rahman and Zhao (2013) was among the first papers to use (a preliminary version of) the KWW methodology; relative to ours, their work focuses on a wider set of countries yet has a narrower scope: to describe supply links and investigate them within a gravity-equation approach. Our work is less analytic but tries to take full advantage of the rich information set that emerges from looking at WIOD tables through the lenses of the KWW decomposition. In fact, tractability requires to restrict attention to a subset of origin countries out of the forty available in WIOD tables. We have chosen the largest four euro area-countries on the grounds that the structural similarities among them should yield comparable results; in particular, for these countries the manufacturing sector, the one mainly interested by the process of international fragmentation of production, still has a relevant weight on the overall economy.

The diffusion of global value chains and international production networks is one reason why the domestic value added content of exports has been moving along a declining trend in the four economies under examination. A competing explanation, which has been widely disregarded in the literature, rests on the adverse terms-of-trade effect stemming from increasing (imported) commodity prices. In this regard, we embark on a preliminary attempt at assessing the bias of an indicator of "international outsourcing", commonly measured as foreign value added in exports at current prices, when the role of commodity inputs is neglected. In the case of Spain the bias appears to be rather important.

[3] In essence, we will be estimating the (static) elasticity of GDP in France, Germany, Italy and Spain to final internal demand around the world.

Finally, a further contribution of our paper is that we integrate the KWW approach by introducing an additional dimension: the domestic-sector origin of value added embodied in exports. Since manufacturing firms use services as inputs, exports of manufacturing goods include value added that in fact originated in the domestic services sector. Our decomposition strips this domestic value added out of manufacturing exports and reassigns it to the services sector,[4] so that we are able to provide more detailed evidence, for the euro-area countries under examination, on how larger services trade is when measured in value-added terms (Johnson, 2014). Only for France do our results point to a mounting use, in manufacturing firms' selection of production inputs, of services from the *domestic* supply chain. On the contrary, for all four economies it emerges quite clearly that the reduction of the value added generated in the domestic manufacturing sector has been associated with an increased use of imported inputs.

By design, ours is an accounting exercise aimed at "getting stylized facts straight" that is unfit for analysing the causes and consequences of euro-area countries' participation in global value chains. By extending our initial contribution on the Italian economy (Cappariello and Felettigh, 2013), the present work is however a useful step towards a better understanding of the opportunities and the challenges, for the main euro-area countries, of economic integration both at a global and at a regional level.

The paper is organized as follows. The conceptual framework proposed by KWW is presented in Section 2 and is implemented in Section 3, where euro-area countries' exports are broken down into domestic value added, foreign value added and a residual component associated with double-counting. This decomposition enables us to describe the main structural features and trends of the participation of the four economies in global value chains. In the rest of the paper, we focus exclusively on the domestic value added component of exports. In Section 4, the impact on the euro area countries' exports and GDP of a shock to foreign demand is estimated. We start with a shock to world demand (global shock) and, in section 5, we analyse geographical effects, i.e. what happens when final internal demand increases in each country around the world in turn (country shocks). Final internal demand around the world activates exports by each sector of the domestic economy; in turn, exports of any given sector contain domestic value added that has been created, directly or indirectly, in all domestic sectors. In section 6 we analyse the domestic-sector origin of the domestic value added embodied in exports, briefly commenting on these inter-sectoral domestic linkages. Section 7 summarises our main findings and concludes.

2. Conceptual framework and data

We use the framework proposed by KWW, who were the first to develop a fully coherent accounting identity that breaks up a country's gross exports into value-added components by source. The authors' methodology, an improvement upon the seminal idea of Johnson and Noguera (2012), decomposes a country's gross exports into three main terms: domestic value added, foreign value added, double-counted value added. We label the first item GDPX, namely the country's GDP embodied in its gross exports. The second component consists of foreign value added embodied (via imports of intermediate inputs) in the country's gross exports. The last component is connected with goods that cross borders multiple times

[4] Preliminary attempts in this direction include Timmer et al. (2013), and Cappariello (2014, relying on national input-output tables).

and it consists of value added, domestic or foreign, that is embodied in the country's gross exports and has already been recorded by its trade statistics despite it contributes only once to its GDP.[5,6]

KWW further decompose each of these three components into categories depending on the use (final *vs* intermediate) of the exported goods and services and on the geographical origin (foreign *vs* domestic) of the final demand that activated them. A total of nine sub-components is obtained (see the Appendix for the algebraic details). In this paper we focus on domestic value added and follow the author's decomposition of GDPX into the first five sub-components as indicated in Figure 1,[7] which clarifies that a country's GDP is embodied into exports of:

1. Final goods and services.
2. Intermediates that are absorbed by the direct importer, i.e. that are used by the direct importer to produce final goods and services to be consumed in the country itself. The sum of components 1 and 2 is labelled "absorption" to indicate domestic value added that is absorbed abroad by the direct (first) importer.
3. Intermediates that the direct (initial) importer embodies into other goods and services (final or intermediate), which then are exported to third countries. This component is labelled "redirection" to indicate domestic value added that is absorbed abroad by countries other than the direct (initial) importer.
4. Intermediates that are ultimately absorbed at home, embodied in imports of final goods and services.
5. Intermediates that are ultimately absorbed at home, embodied in imports of intermediate goods and services (used to produce final goods and services for domestic consumption). The sum of components 4 and 5 is labelled "reflection" to indicate domestic value added that is exported but is ultimately absorbed at home. Another label would be "export content of imports", mirroring the more familiar phrase "import content of exports". Whatever the name, this component measures the contribution of a country's internal demand to the activation of its own exports.[8]

It should be noted that the KWW decomposition as presented in Koopman et al. (2014) only applies to the overall exports of a given country. A detailed decomposition of either

[5] A simple example can clarify. Suppose that Italy exports an intermediate good ("good A") to Germany worth €100 and embodying, for simplicity, only Italian domestic value added. The intermediate good is assembled by a German firm, together with €20 of German value added, into a second intermediate good that is exported to Italy. Italy imports the good ("good B") for €120 and assembles it, together with €10 of domestic value added, into a final product ("good C") that is exported for €130. Italian gross exports are thus recorded as €100+€130=€230. The Italian value added contained therein is €100+€10=€110, whereas the German value added content is €20. The difference between Italian gross exports (€230) and the sum of Italian and German value added (€110+€20=€130) is indeed the value of good A, which has been exported twice by Italy: after the initial shipping to Germany, it returns home embodied into good B and is exported again embodied into good C. Koopman et al. (2014) correctly identify the value of good A (€100) as value added that is double-counted by Italian trade statistics.

[6] Trade statistics all over the world record flows on a gross basis, hence including double-counting.

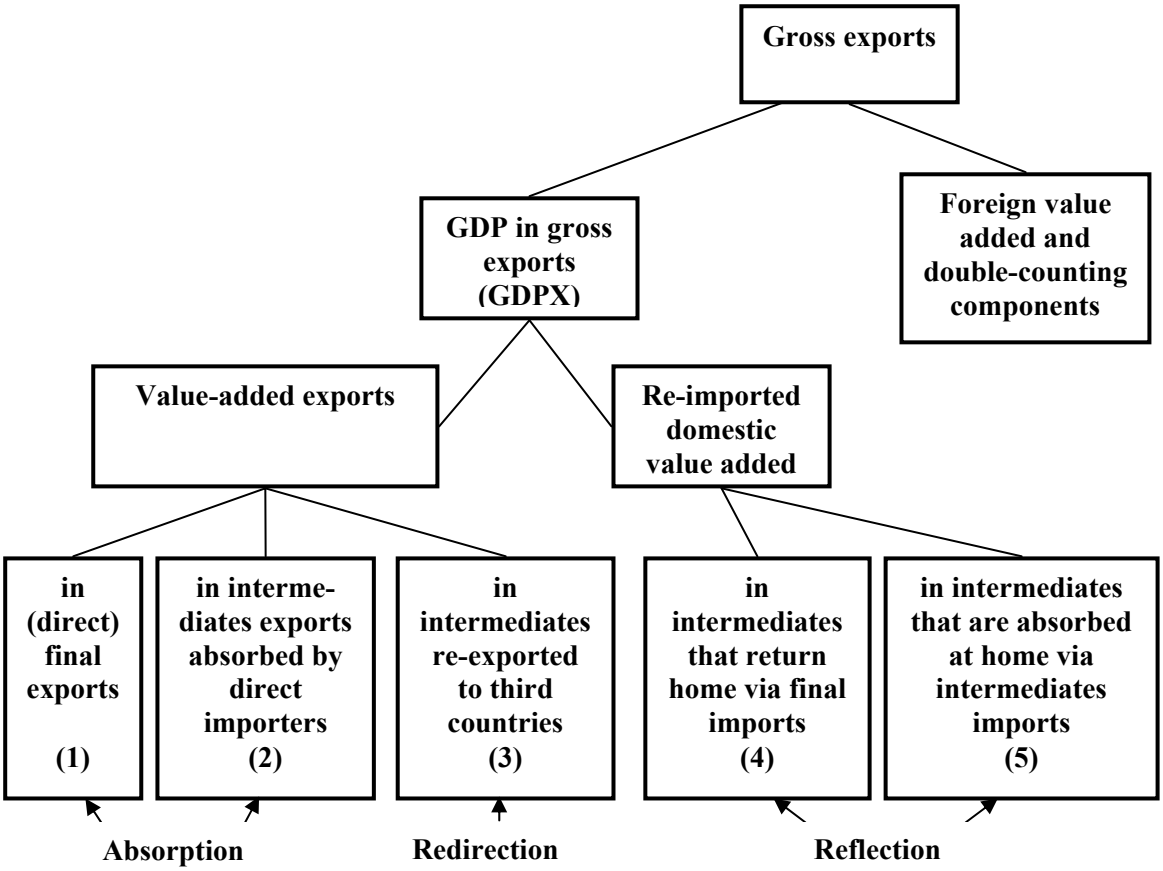
[7] The figure is a simplified version of Figure 1 in Koopman et al. (2014); the labels "absorption", "redirection" and "reflection" are taken from Johnson and Noguera (2012).

[8] We do not address the import side in this paper, but it may be useful to point out that (i) the "export content of imports" contributes to double-counted value added in import trade statistics; (ii) internal demand is clearly more effective in activating imports than exports.

bilateral flows or of sectoral exports entails a more complicated algebraic derivation, which is the subject of the work by Wang, Wei and Zhu (2013).

Figure 1

Main components of value added in gross exports: concepts



In interpreting the results from the KWW decomposition, one has to keep in mind that this strand of literature measures value added on a domestic rather than a national basis. A domestic firm that off-shores its entire production and sales would contribute to national income via profit repatriation but not to the home country's GDP.

We embrace the metric proposed by Rahman and Zhao (2013) whereby sub-components 1 and 2 (absorption) tell us "how much of a country's exports is created as stand-alone exports, i.e. outside any supply chain". The remainder, which consists of domestic value added sub-components 3 to 5 together with foreign value added and the double-counting component (Fig. 1), measures exports generated due to the participation in global value chains ('international fragmentation of production' hereafter).

KWW and Rahman and Zhao (2013) entertain the notion that countries for which the share in gross exports of sub-components 3, 4 and 5 (intermediates that are further processed abroad for ultimate absorption in a country rather than the first importer) is relatively large tend to be specialized in upstream activities. Vice-versa, a relatively large share of foreign value added in gross exports tends to signal that the country is specialized in downstream (or assembling) activities. As we shall make some reference to these categories, it is important to

keep in mind that they refer to sequential production stages, not to the allocation of value added among the players in a global value chain. For instance, oil extraction and water bottling are upstream activities, respectively, relative to gasoline sale at the pump and running a restaurant (downstream activities). One would expect the value-added-intense activities to be the upstream one in the gasoline case, the downstream one in the water case.

We start our analysis from 1999, the year when the exchange rates among the first 11 members of the Monetary Union were fixed, in order to eliminate any bias due to currency movements with respect to the other countries that eventually joined the euro area. In particular, we exclude the period 1995-1998, when also within our sample of countries sharp *relative* exchange rate movements occurred.

WIOD tables are input-output tables for the global economy, disaggregated into 40 countries (plus a "rest of the world" aggregate) and 35 sectors. All data collected from national sources are converted into US dollars. For a more detailed presentation of the WIOD database, see Timmer (2012). It is important to point out that exports of goods and services connected to international tourism are absent from our analysis since these flows are recorded in WIOD tables as a separate entry ("Purchases on the domestic territory by non-residents"), a sort of memo item that cannot be treated as a separate 36th sector due to missing pieces of information.

3. Participation of euro-area countries in global value chains: similarities and differences

This paragraph describes structural features and trends of the participation by the main euro-area countries in global value chains. While the complete time series can be found in the Appendix, here we identify three sub-periods, covering many relevant developments in euro-area integration and, more generally, in world trade. The first one, from 1999 to 2007, namely the period of the introduction and the strengthening of euro, includes the opening up of the Chinese economy to world trade, especially after joining the WTO in 2001. The same time span also covers a period of increasing trade and investment flows into Eastern Europe, started in the early '90 and culminated in the accession of 12 new EU members by 2007. The second period of analysis, between 2007 and 2009, focuses on the "global financial crisis" and the "Great Trade Collapse". The last period, from 2009 and 2011, includes the rebound of international trade but also the beginning of the "sovereign debt crisis" in the euro area.

Table 1 presents the breakdown of the value-added content of exports of goods and services for the major euro-area economies, as obtained from the KWW decomposition. In order to focus on the three sub-periods described above, we present results for four key years, 1999, 2007, 2009 and 2011.[9] By looking at the different components of each country' exports, we can assess similarities and differences among the major euro-area countries in the characteristics of their participation in global value chains.

Firstly, in the overall period of analysis the ability of exports to activate value added in the domestic economies, as measured by the GDPX share (column 6 of table 1), declined sensibly in all four countries, dropping the fastest in Italy. Its development reflects the increasing trend of the two complementary components: the share of foreign value added and

[9] For the complete time series, see Tables A1 in the Appendix.

of double-counting. Another feature worth emphasizing is that the GDPX share presents a counter-cyclical pattern: it decreased in the pre-crisis period, rebounded during the Great Trade Collapse and resumed declining afterwards.

Table 1

Decomposition of gross exports of goods and services for the main euro-area economies

(as a percentage of total gross exports, except otherwise indicated)

		Gross exports								Memo item: "International fragmentation of production"
		GDP in gross exports (GDPX)						Foreign value added	Double counting	
		Value added exports			Re-imported domestic					
Year	Gross exports (in millions of dollars)	in direct final exports	in inter-mediates exports absorbed by direct importers	in inter-mediates re-exported to third countries	in inter-mediates that return home via final imports	in inter-mediates that are absorbed abroad via inter-mediates imports				
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
					France					
1999	351,545	33.9	34.7	8.3	0.8	0.5	78.2	16.7	5.0	31.4
2007	636,359	30.8	31.9	8.9	0.8	0.5	72.9	19.8	7.3	37.3
2009	564,579	31.9	34.1	8.2	0.7	0.5	75.3	18.9	5.9	34.1
2011	691,460	29.1	32.8	8.0	0.7	0.5	71.0	21.4	7.6	38.1
					Germany					
1999	600,303	34.3	34.5	8.0	1.6	1.0	79.3	15.4	5.3	31.2
2007	1,510,356	29.0	32.5	8.3	1.3	0.8	71.9	19.4	8.7	38.5
2009	1,265,888	31.2	34.2	7.8	1.3	0.8	75.2	18.0	6.8	34.7
2011	1,602,979	28.1	33.6	7.6	1.2	0.8	71.4	20.2	8.4	38.2
					Italy					
1999	267,446	39.7	33.2	8.2	0.6	0.4	82.1	14.3	3.6	27.1
2007	574,778	33.2	31.4	9.0	0.5	0.4	74.6	18.8	6.6	35.4
2009	467,639	37.6	31.8	8.2	0.5	0.4	78.4	16.8	4.7	30.6
2011	596,637	32.7	31.0	8.2	0.4	0.3	72.7	20.5	6.8	36.3
					Spain					
1999	134,698	35.4	32.2	8.0	0.5	0.3	76.3	18.9	4.8	32.4
2007	334,953	29.0	31.6	8.9	0.5	0.5	70.5	22.0	7.5	39.4
2009	293,688	32.8	34.1	8.1	0.4	0.4	75.7	18.9	5.3	33.1
2011	386,534	28.1	33.3	7.9	0.3	0.3	70.1	22.6	7.3	38.5

Source: authors' calculations on WIOD data.

Notes: columns (1) to (5) correspond to terms (1) to (5) in Figure 1; column (6) is the sum of columns (1) to (5); columns (6), (7) and (8) add up to 100, consistently with Figure 1; international fragmentation of production in column (9) is measured as the sum of columns (3), (4), (5), (7) and (8).

Secondly, the increasing share of foreign value added in exports (column 7), akin to the indicator of "vertical specialisation" developed by Hummels et al. (2001) and largely used in this literature,[10] signals a growing use of intermediate inputs sourced abroad by euro-area producers and a strengthening of their position as assemblers in downstream activities. The pattern of foreign value added in exports provides clear evidence of the growing backward integration of the production processes, as firms operating in these four economies took

[10] Koopman et al. (2014) show that the original measure of the foreign content of imports by Hummels et al. (2001) is a special case of their measure of foreign value added, since it implicitly assumes that imported intermediates only embody foreign value added.

advantage of differences in technologies, factor endowments and factor prices across countries.[11] By comparing this indicator in levels, we do not observe any major differences among the four economies as of 2011, although a deeper analysis is postponed to section 3.1. Foreign value added in exports is, however, a poor measure of a country's participation in global value chains, a point we shall come back later when addressing international fragmentation of production and when discussing the role of fluctuations in imported commodity prices.

Thirdly, the double counting component of gross exports presents an increasing trend, much steeper than that of the foreign value added component, testifying an increasingly complex participation of the four economies in international production chains, with intermediates and components crossing the domestic borders multiple times (column 8). Table 1 reveals that in 2011 the double counting component inflated gross exports of the four countries in a range between 6.8 and 8.4 per cent, preventing the foreign value added in exports to be the mirror image of GDPX. Although small in absolute terms, this component represented about one fourth of the gross exports not accounted for by their domestic value added. The role of double-counting is even bigger in dynamic terms: it was the counterpart of between one third (for Italy) and 40 per cent (for Spain and Germany) of the drop in GDPX between 1999 and 2011. A pro-cyclical behaviour of both the foreign value added and the double counting components can be observed in the period under examination.

Fourthly, the component related to the four countries' specialisation in upstream activities (sum of columns 3, 4 and 5) remained quite flat between 1999 and 2011, at around 9 to 10 percentage points. Focusing on columns 4 and 5, virtually all GDPX produced in the four economies was absorbed abroad; a slightly higher level of re-imported domestic value added for Germany (about 2 percentage points) is probably explained by the larger size of this economy.

Finally, international fragmentation of production increased significantly as of 1999 in all four economies (last column of Table 1)[12]; in 2011 almost 40 per cent of gross exports involved the participation in global value chains. Italy is the country for which the indicator of international fragmentation of production started at the lowest level and grew at the fastest pace, although in 2011 it was still slightly below the average of the remaining countries. While this suggests that Italy is still lagging behind in the participation to global value chains, the result is mainly driven by a lower share of the double-counting component for the Italian economy, at least with respect to Germany.

A word of caution is necessary on the role of fluctuations in the exchange rate of the euro for the results presented in Table 1. It is fair to assume that a large fraction of French, German, Italian and Spanish exports and imports are quite independent of the exchange rate of the euro vis-à-vis the US dollar; for instance, all trade with euro-area partners. This being the case, these transactions fluctuate with the exchange rate as WIOD tables convert them from euros to US dollars for international comparison. In general, we do not expect our results to be greatly affected by exchange-rate fluctuations, as we express value added

[11] The analysis of the geographical origin of foreign value added in euro-area countries' exports shows an increasing share of imported inputs from both technologically advanced economies and low-labour-cost countries, thus suggesting a variety of motivations for the increase of this indicator (Amador et al., 2015).

[12] Nagengast and Stehrer (2014) propose a revised version of the KWW decomposition. In their methodology, the domestic value added in intermediates re-exported to third countries is larger and consequently so is international fragmentation of production.

contents in percentage of exports. More specifically, the sensitivity to the exchange rate affects both exports and imports, in different proportions depending on composition, and consequently, in loose terms, also the split of exports between domestic and (imported) foreign value added is affected. The role of imported raw materials, which are the main cause of composition mismatch between exports and imports for our four economies, is addressed in the next section.

3.1. A digression on foreign value added in exports: the impact of fluctuations in commodity prices

One might expect that the sharp increase in commodities prices between 1999 and 2011, in particular energy raw materials, introduced an upward bias in the foreign value added content of the main euro area economies' exports measured, as we and the vast majority of the literature do, at current prices. Since these resources are mainly acquired through imports, a change in the terms of trade is likely to drive up the foreign value added in exports, another reason why this indicator is a poor measure of vertical integration.[13]

A big step towards the use of foreign value added as an indicator of "international outsourcing" would be to isolate the role of commodity prices. We fall short of this ambitious target and focus here, for each of the four countries under analysis, on the portion of the foreign value embodied in its exports that originated, both directly and indirectly, in the commodities sector of foreign countries.[14] That is, we look at the value of imported commodities, not just at their price. For this reason, our estimates are only indicative of the above-mentioned terms-of-trade effect, since commodity-price fluctuations may be counteracted or reinforced by independent fluctuations in the degree to which exports depend on imported commodities (due for example to export composition, or to energy-friendly technological improvements).

We report our results in Table 2, where the foreign value added in exports - already presented in column (7) of Table 1 - is compared with the measure net of commodity inputs. Beginning with the overall foreign-value-added content of exports, in 2011 the level of this indicator is very similar across our four economies, standing at around 20-22 per cent. Italy and Spain started off in 1999, respectively, from the lowest level (14.3 per cent) and the highest level (18.9 per cent).

Looking at the foreign-value-added content of exports net of the component originated in the commodities sector abroad (for each country, the third column in Table 2), the growth experienced in Italy shrinks in absolute terms to a magnitude that is very similar to that recorded in France and Germany (around 3 percentage points), although the finding that Italy started from the lowest level in 1999 (13.2 per cent, against an average of 15 for the other two countries) is still confirmed. For Spain, commodities account for the entire increase in foreign value added: net of this component, the finding that Spain started from the highest level in 1999 (17.1 per cent) still holds, whereas the 2011 level is no longer the highest; it is in fact close to the minimum recorded by Italy (16.9 and 16.0 per cent, respectively).

[13] Notice that also indirect imports matter, as cost pressures on commodities are passed through to final and intermediate products (gasoline and basic metal products are a prominent example).

[14] After experimenting with a definition of "commodities" that includes both agriculture and mining and quarrying, we have restricted our focus on the latter, since the share of foreign value added originated in the agriculture sector abroad tends to be stable over time for all countries under examination.

Not surprisingly, for each of the four euro-area countries, the overall foreign-value-added content of exports net of the component originated in the commodities sector abroad is driven by the component embodied in manufacturing exports.[15] More interestingly, the finding that foreign value added dropped with the international crisis in 2009 holds even after controlling for imported commodities.

In conclusion, for France, Germany and Italy we can safely assess that the increase in foreign value added shares is not just driven by the hike in resource prices. For Spain, the value of imported commodities, including indirect imports, seems to account for the entire increase in the overall foreign-value-added content of exports, although we are not able to disentangle price effects from quantity effects.

Table 2

Foreign-value-added content of overall exports, including and excluding commodity inputs

(as a percentage of total gross exports)

	France			Germany			Italy			Spain		
Year	Foreign-value-added content of exports (FVAX)	FVAX originated in commodities sector abroad (FVAXcomm)	FVAX net of FVAXcomm	Foreign-value-added content of exports (FVAX)	FVAX originated in commodities sector abroad (FVAXcomm)	FVAX net of FVAXcomm	Foreign-value-added content of exports (FVAX)	FVAX originated in commodities sector abroad (FVAXcomm)	FVAX net of FVAXcomm	Foreign-value-added content of exports (FVAX)	FVAX originated in commodities sector abroad (FVAXcomm)	FVAX net of FVAXcomm
1999	16.7	1.1	15.6	15.4	0.9	14.5	14.3	1.1	13.2	18.9	1.8	17.1
2000	18.7	1.8	16.9	16.8	1.5	15.4	16.4	2.0	14.4	21.5	2.9	18.6
2001	18.4	1.7	16.7	16.8	1.4	15.4	16.0	1.8	14.2	20.1	2.5	17.6
2002	17.9	1.6	16.3	16.0	1.3	14.7	15.3	1.7	13.7	19.3	2.2	17.1
2003	17.4	1.5	15.9	16.3	1.4	14.9	15.4	1.7	13.6	19.0	2.1	16.9
2004	18.1	1.8	16.2	16.9	1.6	15.3	15.9	2.0	13.9	19.8	2.6	17.2
2005	18.8	2.5	16.3	17.9	2.1	15.8	16.9	2.8	14.1	20.4	3.5	16.8
2006	19.6	2.9	16.7	19.0	2.7	16.3	18.5	3.4	15.1	21.9	4.5	17.4
2007	19.8	2.7	17.1	19.4	2.4	16.9	18.8	3.3	15.5	22.0	4.2	17.8
2008	20.7	3.6	17.1	20.0	3.0	16.9	19.4	4.0	15.3	22.2	5.4	16.7
2009	18.9	2.4	16.5	18.0	1.9	16.1	16.8	3.4	13.4	18.9	3.8	15.1
2010	20.5	2.5	17.9	19.5	2.1	17.3	19.7	4.4	15.3	21.0	4.6	16.3
2011	21.4	2.8	18.6	20.2	2.1	18.0	20.5	4.5	16.0	22.6	5.7	16.9

Source: authors calculations on WIOD data.
Notes: "commodities" are identified with the "mining and quarrying" sector.

4. The impact of world demand on gross exports and GDPX

The KWW methodology enables us to trace back export flows, and the domestic-value-added content they generate, to the final internal demand that activated them. In this paragraph, we set off to estimate the (static) elasticity of a country's GDP to final internal demand around the world (including the country itself so as to capture the reflection component) by relying uniquely on data taken from WIOD input-output tables. These provide a fixed set of "structural" parameters (technical production coefficients, market shares and so on) which indeed change from one year to the other, but are held constant when a positive shock to foreign demand is considered and all else expands in proportion.

[15] Tables A2.a and A2.b in the Appendix report results for manufacturing and services exports, respectively.

In particular, we assume a unit elasticity of exports to world GDP; recent studies focussing on world trade have estimated its elasticity to world GDP to be either around 2.0-2.5 (Cheung and Guichard, 2009) or larger than 3 (Freund, 2009).

It is important to stress that we estimate the effect of external final demand on nominal GDP neglecting exports of travel services associated with tourism. In 2011 exports of travel services amounted to about 13 per cent of total Spanish exports of goods and services; the percentage was more than 6 per cent for France and Italy, and 2 per cent for the German economy. Our measure of the impact of external demand on domestic GDP may therefore be considered a lower bound for Spain and, to a lesser extent, Italy and France.

Figure 2 presents, for each year between 1999 and 2011, the impact on the domestic value added of the main euro-area countries of a 10 per cent positive shock to world final demand in that year. By using such impact as an indicator of the role of foreign final demand for the generation of domestic value added, Figure 2 reveals that the reliance of France, Italy and Spain on foreign demand remained broadly flat over the period, whereas it increased markedly for Germany.

The impact of external demand on domestic GDP is driven by two factors: the impact on gross exports (trade openness) on the one side, and the domestic-value-added content of each dollar-worth of exports on the other side (we label the latter magnitude "GDPX-intensity", which is simply obtained by dividing column 6 in Table 1 by 100). The dynamics of these two driving forces are presented in Figures 3 and 4 respectively.

As already mentioned, GDPX-intensities display a decreasing trend in all countries, with Italy and Spain tracing the upper and the lower bound, respectively. Of the two driving forces, trade openness is the prevailing one: it remained broadly stable in France, Italy and Spain, while German exports as a share of GDP rose from roughly 30 per cent in 1999 to over 45 in 2011 (Fig. 3).[16]

A visual analysis suggests that, in general, the relevance of foreign final demand for the creation of domestic value added evolved in a pro-cyclical fashion. For the ease of exposition, we consider the German case: the indicator grew between 1999 and 2007, with a slowdown around the recession in 2002-2003, it fell sharply in 2009 with the Great Trade Collapse and it rebounded afterwards. This is again the net effect of two factors: a volatile pro-cyclical trade openness more than compensates for a moderately counter-cyclical GDPX-intensity. The latter is a mirror image of the pro-cyclical pattern of the use of imported inputs, driven by firms' attempt at reducing variable costs common to the majority of European countries (Amador et al., 2015), and of the double-counting component.

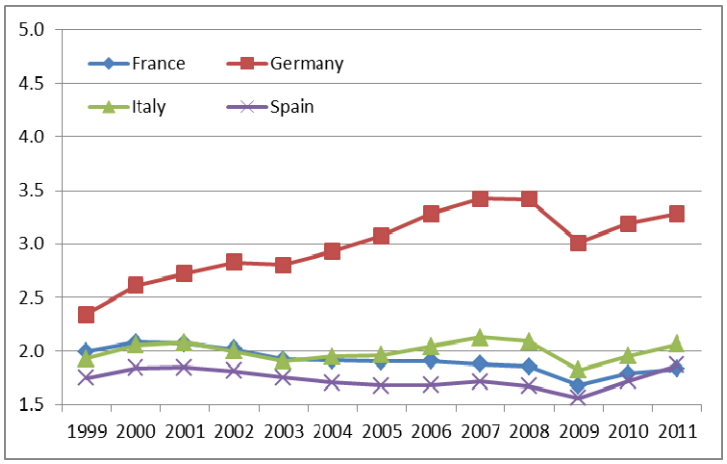
A noticeable result is that Germany is the only country in our analysis that increasingly benefitted from external demand in order to generate GDP: the higher and steeper degree of openness of the German economy is reflected in the upward sloping trend of the sensitivity of GDP to external demand, which is only partially smoothed by the reduction in the GDP-intensity of exports. As seen in the previous paragraph, the latter reflects not only the increasing use of imported inputs but also the mounting relevance of multilateral ("triangular") production sharing, through double-counting.

[16] It should be obvious that in our comparative statics exercise, the share of exports in GDP coincides with the impact on gross exports of a 100 per cent increase in world demand.

Figure 2

Impact on GDPX of a 10% increase in world final internal demand

(as a percentage of GDP)

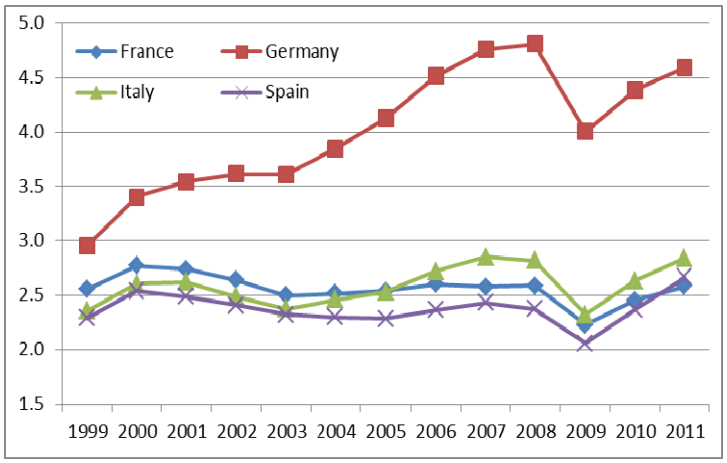


Source: authors' elaborations on WIOD data.

Figure 3

Impact on gross exports of a 10% increase in world final internal demand

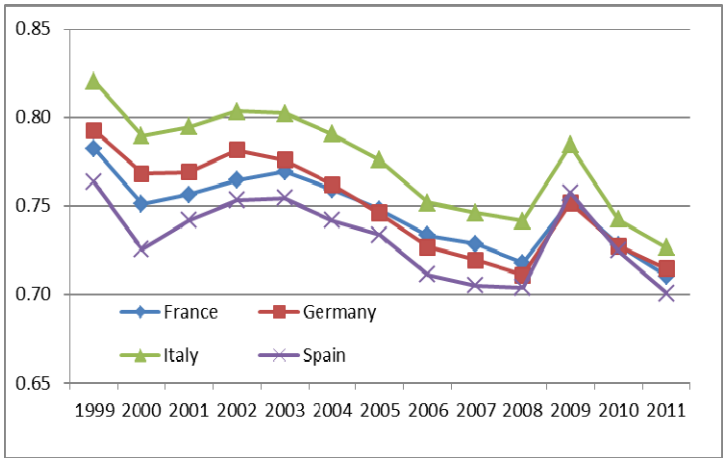
(as a percentage of GDP)



Source: authors' elaborations on WIOD data.

Figure 4

GDPX-intensities



Source: authors' elaborations on WIOD data.

5. Bilateral results

In order to focus on the relevance of different areas and countries for the creation of GDP in the four economies under analysis, we address the following question: how does final internal demand in the various countries around the world contribute, via the exports they activate, to the generation of GDP in France, Italy, Germany and Spain? For instance, we are about to shock final internal demand in the US and measure the impact on Italian exports, both directly and indirectly (that is, Italian intermediate exports to third countries, where they are assembled into final goods to be ultimately exported to the US).

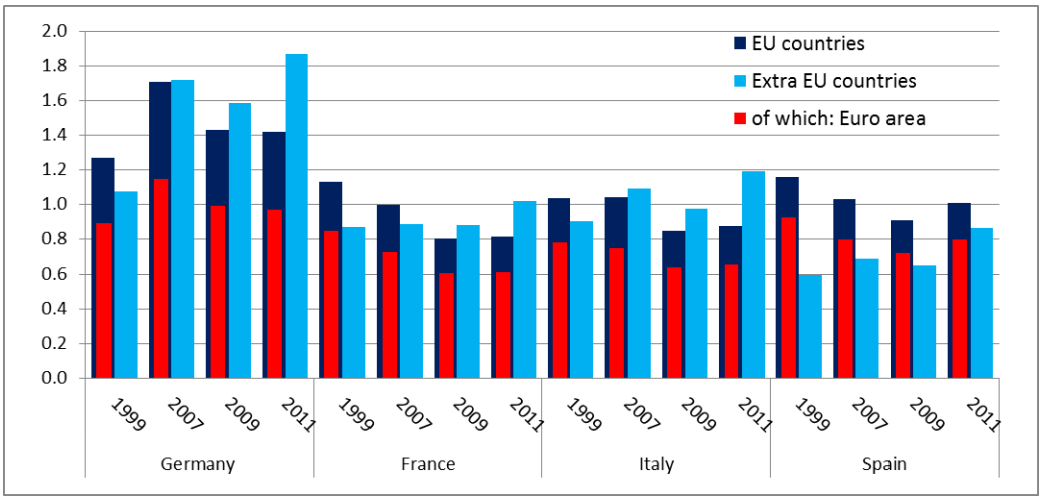
In fact, we present the results of a comparative statics exercise that estimates the impact of a 10 per cent increase in final internal demand in country *j* on the GDP of France, Germany, Italy and Spain, given the technical coefficients and international organisation of production as represented by the WIOD matrix in a given year and everything else equal. In this exercise no second-round effects are considered: final demand increases in country *j*, global value chains are activated around the world in order to meet that demand, but final demand in all other countries remains unchanged.

We start with an analysis by macro-regions: the EU (with the detail of the monetary union) on the one side and the bulk of countries outside the EU on the other side; Figure 5 considers a 10 per cent increase in final demand in each macro-region in turn and tracks the response of domestic value added in the four economies under analysis. Results are reported as a share of GDP.

Figure 5

Impact on GDPX of a 10% increase in the EU and the extra-EU components of global final internal demand

(as a percentage of GDP)



Source: authors' elaborations on WIOD data.

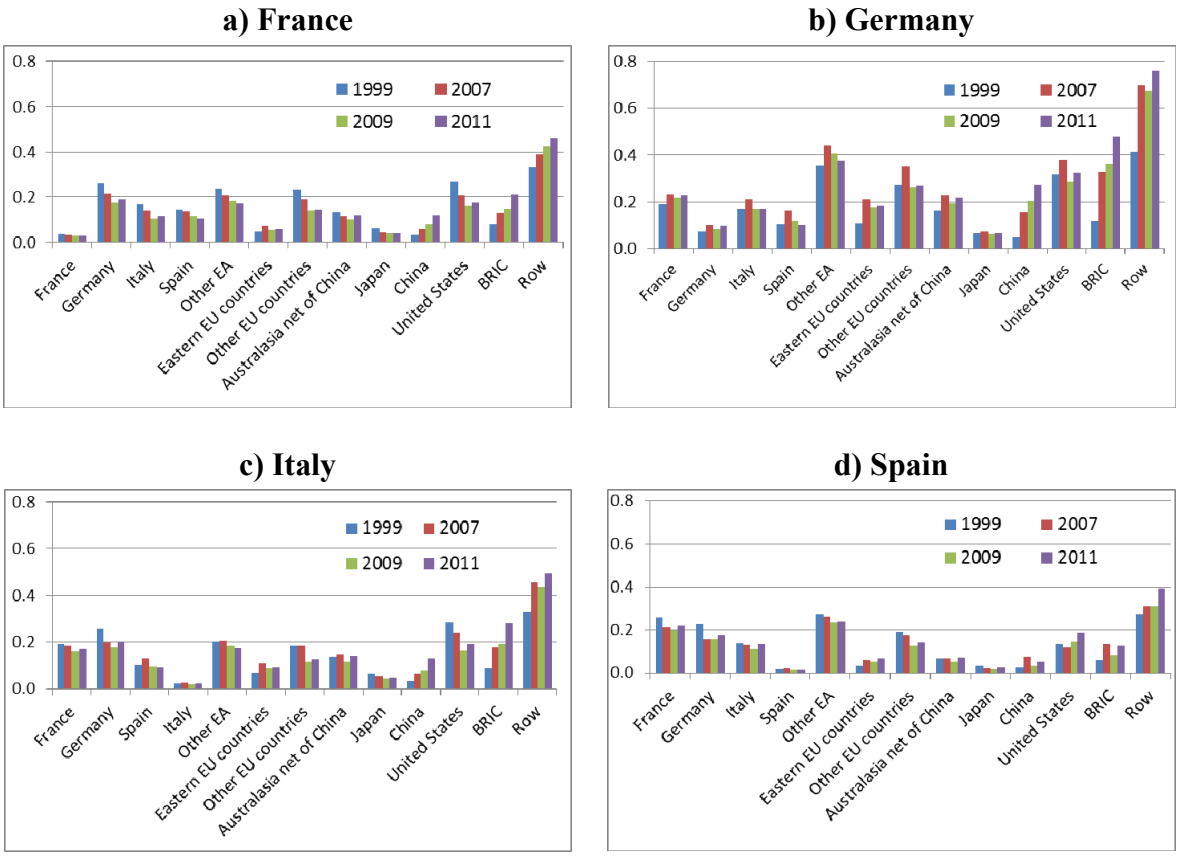
Germany is the only economy for which the dependence on final internal demand originated in the euro area and in the EU rose between the introduction of the euro and 2011. In the pre-crisis period, activation by both components of external demand, from the EU and from extra-EU countries, grew significantly for the German economy, although only the latter

strongly rebounded after the Great Trade Collapse. The overall increasing dependence on final internal demand originated outside the EU is a common feature of the four economies. Only in Spain the EU component of external final demand remained the most relevant in activating GDP throughout the period; in Germany and Italy it lost its primacy already in 2007, in France only in 2009.

Figures 6a - 6d provide further details on our geographical analysis by presenting the response of GDPX in the four euro-area economies to the same 10 per cent increase in final internal demand in some selected countries.[17]

Figure 6

Impact on GDPX of a 10% increase in selected partners' final internal demand
(as a percentage of GDP)



Source: authors' elaborations on WIOD data.
Notes: see the Appendix for a detailed definition of the geographical entities on the x-axis.

Between 1999 and 2007, German GDP became more and more reactive to final external demand from euro-area countries testifying that, with the introduction and the strengthening of the euro, the German economy reinforced its relative position within the euro area. The same pattern can be observed for the activation of German GDPX by the rest of the EU, which is split in the figure between Eastern EU countries and the non-euro EU countries (Denmark, Sweden and UK). After the crisis, the picture partially changed: the activation of German exports and GDP from the other euro-area countries contracted. The reduction was determined by the fall in final demand from the economies hit by the sovereign debt crisis

[17] The underlying data are presented in Tables A3 in the Appendix.

(among them, Italy and Spain). On the contrary, extra-EU countries continued to gain weight in activating German exports and GDPX. This result was driven essentially by China and, to a lesser extent, by some emerging economies such as Russia and Turkey, at the expenses of large advanced economies such as the US and Japan.

For the other three countries, in general the elasticity of GDPX to final internal demand originated in the euro-area countries, in particular Germany, decreased as of 1999, with only a minor rebound after 2009. Activation from Eastern EU countries, China and the rest of BRICs tended to increase over time.

Between 1999 and 2007, the impact of final internal demand in euro-area countries on Italian GDPX slightly weakened. In fact, the result is entirely due to the reduction of the impulse driven by German final demand; net of this country, activation of Italian GDP by final internal demand from the euro area slightly increased in the period.

Figure 6 also shows a delay of the Italian, French, and especially Spanish producers with respect to their German competitors in taking advantage of the enormous growth potential of the Chinese market.[18] The corresponding elasticity was almost identical for all four countries in 1999 (and tiny, between 0.03 and 0.05); by 2011 it only doubled in Spain, it increased almost four-fold in France and Italy and it rose six-fold in Germany.

As mentioned in the introduction, multi-country production networks imply that intermediate goods can travel to their final destination by an indirect route ("triangular" production sharing). For instance, when Italian intermediates are assembled in Germany into final goods to be exported to the US, it is final internal demand in the US that is activating Italian exports (to Germany). This requires a distinction, for a country's exports, between the initial destination (as recorder by trade statistics) and the "ultimate" destination (as detected by WIOD tables), i.e. the partner country whose final internal demand activated the original export flow.

Switching from a "destination" perspective to an "activation" perspective leads to a reassessment of the drivers behind export-led GDP growth, as Figure 7 clarifies by considering the same macro-regions of Figure 5 (EU, euro-area, extra-EU). The blue bars in the four panels report the percentage of the corresponding country's gross exports in 2011 that was shipped to each macro-region, while the red bars depict the percentage of the country's gross exports that was activated by final demand internal to each macro- region. Similarly, the green bars represent the percentage of the country's GDPX that was activated by final demand in each macro-region.

In the figure, for a given reporting country and a given macro-region, the red and the green bars tend to be very similar, while they differ from the blue bar. That is, what makes a difference is the "destination" perspective as opposed to the "activation" perspective (blue *vs* red and green), whereas within the "activation" perspective it is quite immaterial whether we focus on gross exports (red bars) or on the their GDP content (green bars). The main message of Figure 7 is that trade statistics overestimate the role of the EU (or the monetary union) in driving gross exports and GDP of the four main euro-area countries. Clearly, the opposite holds for the role of partner countries outside the EU. The main reason behind this finding is

[18] Nevertheless, Germany, France and Italy do not show a significantly different pattern in the strengthening of the backward linkages with the Chinese economy, as measured by the growth of imported inputs (Amador et al., 2015).

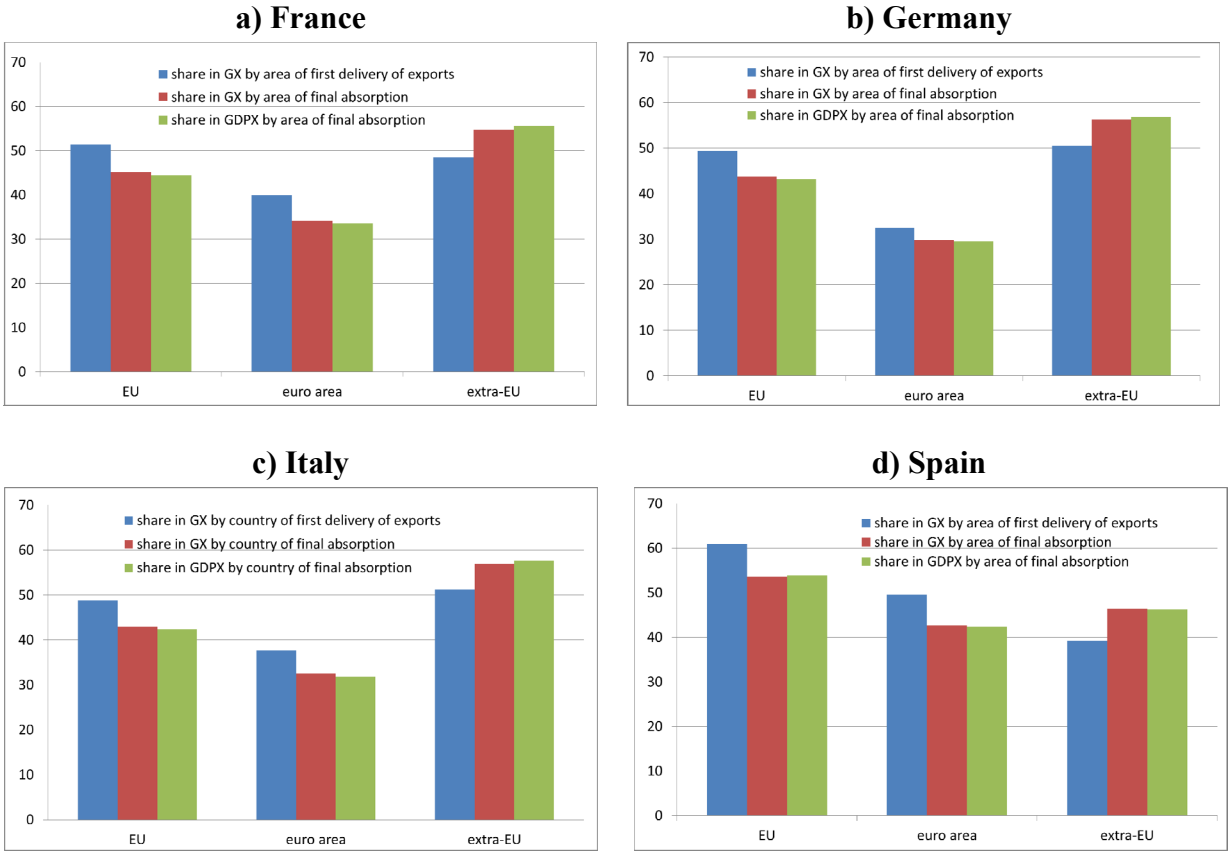
the strengthening of regional supply chains within Europe: taking Germany and Poland as an example, a significant portion of German exports to Poland consists of intermediates that are assembled in Poland into final products that are shipped abroad to be consumed (or invested) in third countries outside the EU.

For each of our four countries, the difference between the blue bar for the EU and the red bar for the EU tends to be explained almost entirely by the corresponding difference for the euro-area bars. Germany is the only exception, signalling that the regional supply chains for this economy tend to be stronger with EU countries outside the euro area than with countries inside the monetary union.

Figure 7

Gross exports and GDPX of the main euro-area countries in 2011: shares by area of first delivery of exports and shares by final absorption

(percentage points)



Source: authors' elaborations on WIOD data.

6. Sectoral analysis of exports and GDPX

Final internal demand around the world activates exports by each sector of the euro-area economies under analysis. In turn, exports of any given sector contain domestic value added that has been created, directly or indirectly, in all domestic sectors along "intra-national value chains". Figure 8 presents, for the domestic value added content of overall exports of goods

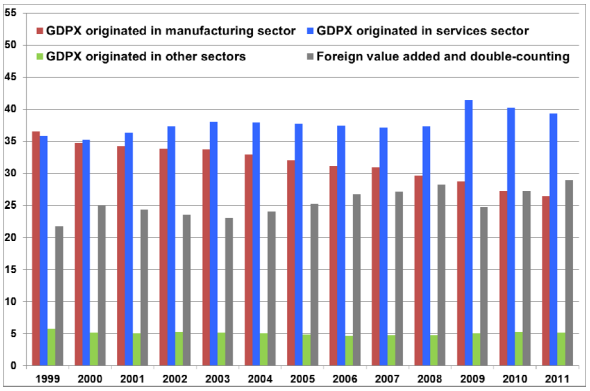
and services, the percentages that originated in domestic manufacturing, in services and in other sectors. It also shows the share of exports originated in global value chains, that is, the sum of foreign value added and the double-counting component. These enable us to comment on the contribution of the domestic macro-sectors to the creation of value added through exports.[19]

A visual analysis of Figure 8 reveals that, for all four countries, the reduction of the value-added share generated in the domestic manufacturing sector was mainly associated with an increase of the value-added share that originated in international supply chains. However, both the level of these shares and the pace of their change over time differed across the four economies.

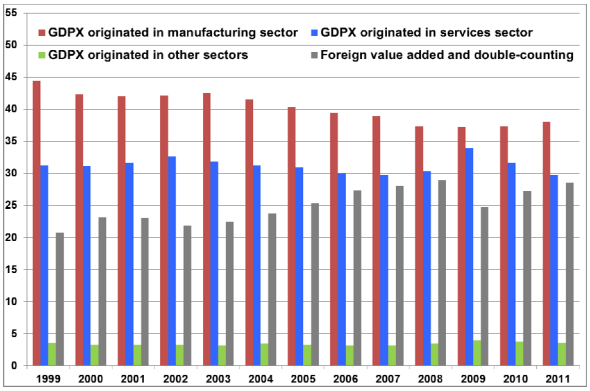
Figure 8

Overall exports of goods and services: shares of value added by origin
(percentage composition)

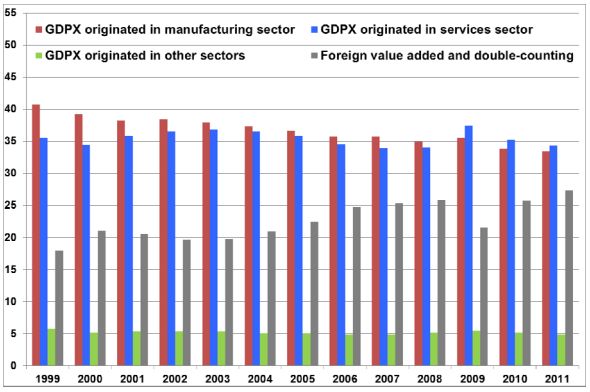
a) France



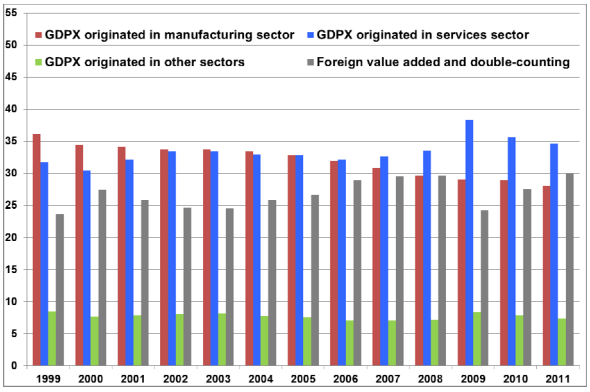
b) Germany



c) Italy



d) Spain



Source: authors' elaborations on WIOD data.
Notes: in every year, the four bars add up to one hundred.

France is the country with the largest and fastest-growing relevance of the services sector, whose weight in GDPX surpassed that of manufacturing already in 2000. By 2011, almost 40 per cent of overall gross exports was value added originated in the domestic

[19] As previously mentioned, tourism is absent from WIOD tables, despite it represents a relevant portion of exports of services for some of the countries under examination (in 2011, 13.5 per cent for Germany, 23.2 per cent for France, 40.6 per cent for Italy, 42.3 per cent for Spain; calculations on balance of payments data from Eurostat, BPM5).

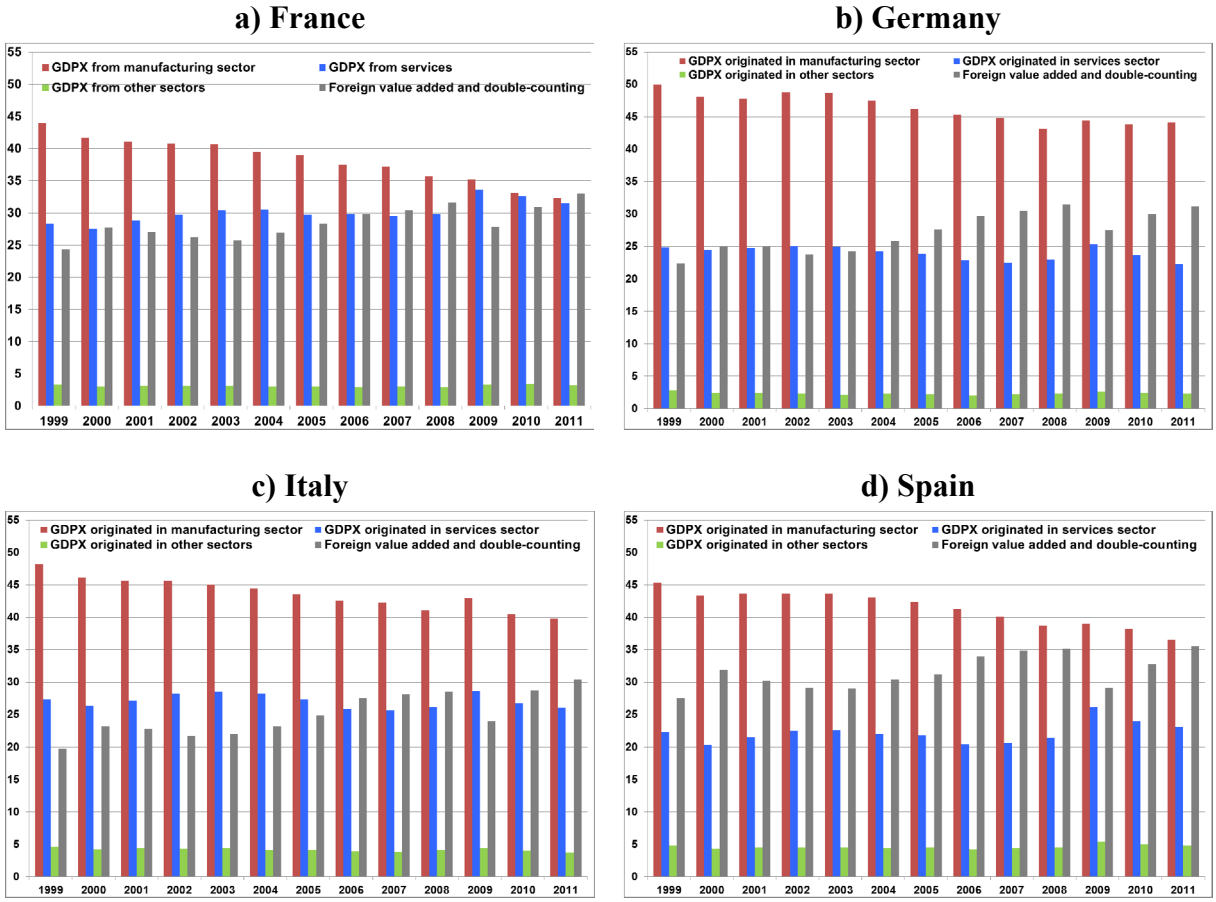
services sector, whereas gross exports of services accounted for just 15 per cent of French sales abroad. The increasing role of services for the French economy is both due to "direct" services exports growing faster[20] and to the growing activation of services by manufacturing exports. This point is clarified in Figure 9, which displays the same decomposition as Figure 8 for exports of manufactures only: while the substitution between domestic and foreign inputs remain a common feature among the four economies, a pattern emerges of an increasing use, by French manufacturing firms, of services from the *domestic* supply chain.

This contribution mostly came from trade services (both retail and wholesale) and from domestic providers of services ancillary to production and marketing of manufactures ("Renting and other business activities"; see Table A4 in the Appendix), which is a black box including such a large range of activities that it is hard to distinguish among competing explanations for the domestic activation of services. On the one hand, French manufacturing firms could have focused on their core competencies by outsourcing their non-core service activities; on the other hand, manufacturing firms could have turned to external service suppliers in order to acquire knowledge-intensive business services and new business solutions that are unlikely to be generated in-house (Beyers, 2005).

Figure 9

Exports of manufactures: shares of value added by origin

(percentage composition)



Source: authors' elaborations on WIOD data.

[20] The composition of French exports slowly moved from manufacturing towards services between 1999 and 2011: the share of manufacturing declined from 81.5 to 80.2 per cent while the share of services increased by 1.4 percentage points (from 13.7 to 15.1 per cent).

In Spain the weight of services as a source of domestic value added embodied in exports of goods and services grew somewhat less rapidly than in France, surpassing the weight of manufacturing in 2006 (Fig. 8). In this case, the result was mainly driven by a stronger re-composition of gross exports towards services.[21]

In Italy the relative weight of services as a source of domestic value added embodied in total exports remained flat. The reduction of the domestic value added originated in manufacturing entirely reflected a decreasing use of inputs sourced from domestic manufacturing chains, which were substituted with imported inputs.

Despite the strong substitution of value added generated in the domestic manufacturing sectors with value added sourced from abroad, Germany is the only country where manufacturing remained the predominant source of GDPX throughout the period. Germany stands out in the present context for two more reasons: on the one side, despite a mild re-composition of German gross exports towards services, the manufacturing share of exports remained relatively high with respect to the other economies; on the other hand, the contribution in terms of value added of the domestic suppliers operating in the services sector to the exports of manufactures slightly decreased. This result may be explained by the fact that German manufacturing firms tend to be larger than their euro-area competitors, and for bigger units it is easier to undertake multiple tasks "in house" rather than outsourcing them to other economic units in upstream domestic sectors.

7. Conclusions

As production has become increasingly organised along global value chains, sequential stages of production are performed at several locations all over the world before assembly into the final product. As a result, traditional indicators based on *gross* exports *alone* are becoming less informative in assessing the contribution to GDP growth (in a given country) of the various sources of final external demand. The reason is two-fold. On the one hand, as economies engage in processing trade, the domestic-value-added content of a country's exports (GDPX) declines, mirroring an increase in the foreign-value-added and in the double-counting components. Such developments are not captured by trade statistics, whose mandate is to record the gross value of goods at each border-crossing rather than the (net) value added between border-crossings. On the other hand, as intermediates travel to their final destination by an indirect, possibly multi-country route, it becomes more complex to associate a country's exports (and their domestic-value-added content) with the final demand that activated them.

The availability of global input-output tables has increasingly allowed the analysis of trade in value added, rather than gross, terms. This paper contributes to this strand of the literature by providing a methodologically sound description of the economic relations that underlie international trade by the largest euro-area countries (France, Germany, Italy and Spain), based on a novel methodology, developed by Koopman et al. (2014), aimed at tracing value added in exports by source and by geographical origin of the final demand that activated them. We also propose (i) an exercise to isolate the role of commodity inputs when calculating a very common indicator of "international outsourcing", the foreign-value-added

[21] Their share in overall foreign sales increased by 4.4 percentage points, from 16.6 to 21.0 per cent.

content of exports (at current prices), and (ii) a decomposition of the domestic-value-added content of exports by domestic sector of origin.

Although we do not claim to analyse the causes and consequences of euro-area countries' participation in global value chains, our accounting exercise provides a useful dashboard towards a better understanding of the opportunities and the challenges that global value chains offer, as well as new tools for policy evaluation.

We focus on the years between 1999 and 2011, covering many relevant developments in euro-area integration and, more generally, in world trade. The time span includes the "Great Trade Collapse", the subsequent rebound of international trade and also the beginning of the "sovereign debt crisis" in the euro area. Our main conclusions can be summarized as follows.

Firstly, the growing participation of the euro-area economies in global value chains is indeed a common structural feature, displaying both a trend and a sensitivity to business cycles. Between 1999 and 2011, the GDPX-intensity, namely the ability of one euro-worth of exports to activate value added in the domestic economies, declined sensibly in all four countries. Its development reflected the increasing trend of the two complementary components: foreign value added and double-counting. The pattern of the former, the classical indicator of "vertical specialisation", provides clear evidence of the growing backward integration of production processes, as firms operating in these four economies took advantage of differences in technologies, factor endowments and factor prices across countries. The steep trend of commodity prices played a role in shaping the mounting relevance of the foreign value-added component, but did not entirely determine it, according to our preliminary assessment. The increasing trend of the double-counting component testifies instead a growing complexity for the participation in international production chains, with intermediate inputs crossing multiple times the domestic borders.

Secondly, we find that the reliance of France, Italy and Spain on foreign final demand in order to generate GDP remained broadly flat over the period, whereas it increased sensibly for Germany. The higher and faster-growing degree of openness of the German economy, only partially smoothed by the reduction in the GDP-intensity of exports, explains this result. We find that an upward bias arises when gauging, on the basis of traditional bilateral trade statistics, the impulse of final internal demand within the EU (or the monetary union) on the GDP of the four major euro area countries. The main reason behind this finding is the strengthening of regional supply chains within Europe: taking Germany and Poland as an example, a significant portion of German exports to Poland consists of intermediates that are assembled in Poland into final products that are shipped abroad to be consumed (or invested) in third countries outside the EU.

Thirdly, the overall increasing dependence on final internal demand originated outside the EU is a common feature for the four economies in the pre-crisis period; instead, activation by the EU-component of final internal demand grew significantly only for the German economy. In particular, with the introduction and the strengthening of the euro, Germany reinforced its relative position within the euro area, with an increasing activation of GDP by final internal demand from the monetary union. On the contrary, for France, Italy and Spain the impact on their GDP of final internal demand originated in the euro area slightly weakened, a result entirely due to the reduction of the impulse driven by German final demand. The picture changed after the crisis: the activation of German exports and GDP by

the other euro-area countries contracted, driven by the fall in final demand from the economies hit by the sovereign debt crisis. On the contrary, extra-EU countries continued to gain weight in activating German exports and GDPX, a pattern common to the other three economies. In particular, between 1999 and 2011 the sensitivity of the German economy to final internal demand in China increased much more than for the other countries, in what we interpret as a delay of the Italian, French, and especially Spanish producers in taking advantage of the enormous growth potential of the Chinese market.

Finally, value added that is embodied in manufacturing exports often originates in a different sector, typically services. Our analysis of the domestic-sector origin of value added embodied in exports reveals that the weight of services as a source of domestic value added embodied in overall gross exports considerably grew over time only for the French and the Spanish economies. The corresponding weight for Italy and for Germany was in 2011 almost unchanged from 1999. France is the country with the largest relevance of the service sector, whose weight in GDPX surpassed the weight of manufacturing already in 2000. This pattern is especially due to the growing activation of services by manufacturing exports and only in part to "direct" service exports growing faster. In Spain the weight of value added originated in domestic services embodied in overall exports grew somewhat less rapidly than in France, surpassing the weight of manufacturing in 2006. In this case, the result was driven by a stronger re-composition of gross exports towards services.

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Appendix

The algebra of the KWW decomposition

In this section we briefly describe the decomposition of gross exports developed by Koopman et al. (2014). We focus on a source country *s* which produces and exports *N* products to *G* countries. Gross exports of country *s* are used as an intermediate or final good abroad, according the following definition:

$$E_{s*} = \sum_{r \neq s}^{G} E_{sr} = \sum_{r \neq s}^{G} \left(A_{sr} X_r + Y_{sr} \right) \tag{A.1}$$

where:

- E_{s*} is the *GN-by-1* vector of exports by country *s* to its *G* partner countries*;*
- E_{sr} is the *N-by-1* vector of gross exports from country *s* to country *r, r=1,...,*G*;*
- A_{sr} is the *N-by-N* input-output coefficient matrix, with typical element a_{sr}^{ij} representing the coefficient for input i in country *s* used in the production of sector *j* in country *r;*
- X_s is the *N-by-1* vector of gross output of country *s;*
- Y_{sr} is the *N–by-1* vector of final demand in country *r* for final goods and services produced in *s.*

By pre-multiplying E_{s*} by the unit vector *u* one obtains aggregate exports (a scalar), which can be decomposed into various value-added and double-counted components as follows:

$$\begin{aligned} uE_{s*} = & \left[V_s \sum_{r \neq s}^{G} B_{ss} Y_{sr} \right] + \left[V_s \sum_{r \neq s}^{G} B_{sr} Y_{rr} \right] + \left[V_s \sum_{r \neq s}^{G} \sum_{t \neq s,r}^{G} B_{sr} Y_{rt} \right] + \\ & + \left[V_s \sum_{r \neq s}^{G} B_{sr} Y_{rs} \right] + \left[V_s \sum_{r \neq s}^{G} B_{sr} A_{rs} \left(I - A_{ss} \right)^{-1} Y_{ss} \right] + \left[V_s \sum_{r \neq s}^{G} B_{sr} A_{rs} \left(I - A_{ss} \right)^{-1} E_{s*} \right] + \\ & + \left[\sum_{t \neq s}^{G} \sum_{r \neq s}^{G} V_t B_{ts} Y_{sr} \right] + \left[\sum_{t \neq s}^{G} \sum_{r \neq s}^{G} V_t B_{ts} A_{sr} \left(I - A_{rr} \right)^{-1} Y_{rr} \right] + \left[\sum_{t \neq s}^{G} V_t B_{ts} \sum_{r \neq s}^{G} A_{sr} \left(I - A_{rr} \right)^{-1} E_{r*} \right] \end{aligned} \tag{A.2}$$

where:

- V_s is the *GN-by-1* row vector of direct value-added coefficients*;*
- B_{sr} is the *N-by-N* block Leontief inverse matrix, which is the total requirement matrix that gives the amount of gross output in producing country *s* required for a one-unit increase in final demand in destination country *r,* with typical element b_{sr}^{ij} representing the coefficient of inputs from sector *i* in country *s* to sector *j* in country *r;*
- X_{sr} is the *N-by-1* vector of gross output produced in *s* and absorbed in *r.*

While the algebra to obtain equation (A.2) may be a bit tedious, expressing a country's gross exports as the sum of these nine terms is very useful. We try to explain briefly their economic interpretations.

The first two terms in square brackets are the direct value added exports, i.e., the source-country value added absorbed by the direct importer, country *r*, in the form of final (first term) and intermediate (second term) imports. The 3rd term is value added of country *s* exported to country *r* and, after some processing in *r*, finally absorbed in a third country *t*.

The 4th and the 5th terms are source value added of country *s* which is initially exported but then returns home in either final (4th term) or intermediate (5th term) imports to be consumed by country *s*.

The 7th and 8th terms represent foreign value added in source country's exports, including foreign value added embodied in both final and intermediate products.

The 6th and 9th terms are the two "pure double-counted terms" that sum up the double-counted share of two-way intermediate trade from all bilateral routes.

Definition of geographical entities

We re-organize the 41 geographical entities considered in WIOD matrices as follows:

1. European Union (EU, 27 countries), broken down in: Euro area (17 members) and countries belonging to the EU27 but outside the Eurozone.
   - The former aggregate is further split as: France, Germany, Italy, Spain, the remaining 13 countries belonging to the Euro area;
   - the latter aggregate is further split between "Eastern" countries[22] and "other" countries (Denmark, Great Britain, Sweden).
2. All countries outside the EU27, further broken down in:
   - Australasia net of China: Australia plus the Asian countries considered in WIOD matrices.[23] The aggregate includes Japan, whose detail appears in some figures/tables.
   - China.
   - Americas (American countries considered in WIOD matrices).[24] The aggregate includes the US, whose detail appears in some figures/tables.
   - Russia and Turkey.
   - All other countries.

In some figures and tables a memo item for BRIC appears.

[22] Bulgaria, Czech Republic, Hungary, Latvia, Lithuania, Poland and Romania.
[23] India, Indonesia, Japan, South Korea, Taiwan.
[24] Brazil and the NAFTA countries (Canada, Mexico, USA).

Table A1.a

Decomposition of French exports of goods and services

(as a percentage of total gross exports, except otherwise indicated)

		Gross exports								Memo item:
		GDP in gross exports (GDPX)						Foreign value added	Double counting	
		Value added exports			Re-imported domestic					
Year	Gross exports (in millions of dollars)	in direct final exports	in inter-mediates exports absorbed by direct importers	in inter-mediates re-exported to third countries	in inter-mediates that return home via final imports	in inter-mediates that are absorbed abroad via inter-mediates imports				Interna-tional fragme nta-tion of producti on"
1995	334642	33.6	37.4	7.7	0.8	0.6	80.1	15.5	4.4	29.0
1996	339102	34.1	36.4	7.6	0.8	0.6	79.5	16.0	4.5	29.5
1997	338362	33.5	36.2	7.6	0.7	0.5	78.6	16.6	4.8	30.2
1998	356010	34.2	34.7	7.8	0.8	0.5	78.0	17.2	4.9	31.1
1999	351545	33.9	34.7	8.3	0.8	0.5	78.2	16.7	5.0	31.4
2000	349817	31.3	33.9	8.6	0.8	0.5	75.1	18.7	6.2	34.8
2001	348540	32.7	32.9	8.7	0.8	0.5	75.6	18.4	6.0	34.3
2002	366869	33.1	33.2	8.8	0.8	0.5	76.4	17.9	5.7	33.7
2003	427267	33.4	33.4	8.8	0.8	0.5	76.9	17.4	5.6	33.2
2004	492932	32.8	33.0	8.7	0.8	0.5	75.9	18.1	6.0	34.2
2005	517610	32.0	32.8	8.6	0.8	0.5	74.8	18.8	6.4	35.1
2006	559843	31.4	31.9	8.7	0.8	0.5	73.3	19.6	7.0	36.7
2007	636359	30.8	31.9	8.9	0.8	0.5	72.9	19.8	7.3	37.3
2008	704819	30.3	31.5	8.7	0.7	0.5	71.8	20.7	7.5	38.1
2009	564579	31.9	34.1	8.2	0.7	0.5	75.3	18.9	5.9	34.1
2010	609074	30.8	32.9	8.0	0.7	0.5	72.8	20.5	6.7	36.4
2011	691460	29.1	32.8	8.0	0.7	0.5	71.0	21.4	7.6	38.1

Source: authors' calculations on WIOD data.

Table A1.b

Decomposition of German exports of goods and services

(as a percentage of total gross exports, except otherwise indicated)

		Gross exports								Memo item:
		GDP in gross exports (GDPX)						Foreign value added	Double counting	
		Value added exports			Re-imported domestic					
Year	Gross exports (in millions of dollars)	in direct final exports	in inter-mediates exports absorbed by direct importers	in inter-mediates re-exported to third countries	in inter-mediates that return home via final imports	in inter-mediates that are absorbed abroad via inter-mediates imports				Interna-tional fragme nta-tion of producti on"
1995	577907	34.5	37.2	7.6	1.6	1.1	82.1	13.4	4.5	28.3
1996	581114	34.0	37.4	7.8	1.5	1.0	81.8	13.6	4.6	28.6
1997	569373	33.2	37.6	7.5	1.4	0.9	80.7	14.6	4.8	29.2
1998	600858	34.3	35.4	7.8	1.6	1.0	80.1	14.8	5.1	30.3
1999	600303	34.3	34.5	8.0	1.6	1.0	79.3	15.4	5.3	31.2
2000	614537	32.1	33.9	8.3	1.6	0.9	76.8	16.8	6.4	34.0
2001	636044	33.0	33.2	8.3	1.5	0.9	76.9	16.8	6.3	33.8
2002	695201	33.8	33.8	8.2	1.5	0.8	78.1	16.0	5.8	32.4
2003	839066	33.5	33.5	8.2	1.6	0.9	77.6	16.3	6.1	33.1
2004	1007507	31.5	33.9	8.4	1.5	0.9	76.2	16.9	6.9	34.6
2005	1096000	30.7	33.3	8.4	1.4	0.8	74.6	17.9	7.5	36.0
2006	1258715	29.6	32.6	8.3	1.4	0.8	72.7	19.0	8.4	37.8
2007	1510356	29.0	32.5	8.3	1.3	0.8	71.9	19.4	8.7	38.5
2008	1671980	28.8	32.0	8.2	1.3	0.8	71.1	20.0	8.9	39.2
2009	1265888	31.2	34.2	7.8	1.3	0.8	75.2	18.0	6.8	34.7
2010	1391739	29.8	33.2	7.8	1.2	0.8	72.7	19.5	7.8	37.0
2011	1602979	28.1	33.6	7.6	1.2	0.8	71.4	20.2	8.4	38.2

Source: authors' calculations on WIOD data.

Table A1.c

Decomposition of Italian exports of goods and services

(as a percentage of total gross exports, except otherwise indicated)

		Gross exports								Memo item:
		GDP in gross exports (GDPX)						Foreign value added	Double counting	
		Value added exports			Re-imported domestic					
Year	Gross exports (in millions of dollars)	in direct final exports	in inter-mediates exports absorbed by direct importers	in inter-mediates re-exported to third countries	in inter-mediates that return home via final imports	in inter-mediates that are absorbed abroad via inter-mediates imports				Interna-tional fragme nta-tion of producti on"
1995	264094	39.8	33.6	6.9	0.4	0.4	81.1	15.4	3.5	26.7
1996	284159	40.3	34.7	7.2	0.4	0.4	82.9	13.9	3.2	25.1
1997	273709	38.7	35.4	7.3	0.5	0.4	82.2	14.4	3.4	25.9
1998	279200	39.8	33.6	7.8	0.5	0.4	82.0	14.4	3.5	26.7
1999	267446	39.7	33.2	8.2	0.6	0.4	82.1	14.3	3.6	27.1
2000	271817	37.4	32.0	8.5	0.6	0.4	78.9	16.4	4.6	30.5
2001	278623	38.1	31.6	8.8	0.6	0.4	79.5	16.0	4.6	30.3
2002	289677	38.9	31.6	8.8	0.6	0.4	80.3	15.3	4.3	29.5
2003	341425	38.8	31.5	8.9	0.6	0.4	80.2	15.4	4.4	29.7
2004	405297	36.2	32.6	9.2	0.6	0.4	79.1	15.9	5.0	31.2
2005	428302	35.1	32.3	9.1	0.6	0.4	77.6	16.9	5.5	32.6
2006	481657	33.4	31.7	9.0	0.6	0.4	75.2	18.5	6.3	34.8
2007	574778	33.2	31.4	9.0	0.5	0.4	74.6	18.8	6.6	35.4
2008	620446	34.0	30.6	8.7	0.5	0.4	74.1	19.4	6.5	35.4
2009	467639	37.6	31.8	8.2	0.5	0.4	78.4	16.8	4.7	30.6
2010	514168	35.0	30.3	8.1	0.4	0.3	74.2	19.7	6.1	34.7
2011	596637	32.7	31.0	8.2	0.4	0.3	72.7	20.5	6.8	36.3

Source: authors' calculations on WIOD data.

Table A1.d

Decomposition of Spanish exports of goods and services

(as a percentage of total gross exports, except otherwise indicated)

		Gross exports								Memo item:
		GDP in gross exports (GDPX)						Foreign value added	Double counting	
		Value added exports			Re-imported domestic					
Year	Gross exports (in millions of dollars)	in direct final exports	in inter-mediates exports absorbed by direct importers	in inter-mediates re-exported to third countries	in inter-mediates that return home via final imports	in inter-mediates that are absorbed abroad via inter-mediates imports				Interna-tional fragme nta-tion of producti on"
1995	109520	37.7	33.7	7.4	0.3	0.3	79.3	16.9	3.8	28.7
1996	121020	37.0	34.2	7.6	0.3	0.3	79.4	16.7	3.9	28.8
1997	125441	35.5	34.3	7.7	0.4	0.3	78.1	17.6	4.3	30.2
1998	132596	37.0	31.9	7.8	0.4	0.3	77.4	18.3	4.4	31.1
1999	134698	35.4	32.2	8.0	0.5	0.3	76.3	18.9	4.8	32.4
2000	140904	32.8	31.0	8.0	0.4	0.4	72.5	21.5	5.9	36.2
2001	144887	32.9	31.9	8.6	0.4	0.4	74.2	20.1	5.7	35.2
2002	158477	34.3	31.8	8.5	0.4	0.3	75.3	19.3	5.4	34.0
2003	195988	33.6	32.3	8.7	0.5	0.4	75.4	19.0	5.6	34.1
2004	229314	32.4	32.2	8.7	0.5	0.4	74.2	19.8	6.1	35.4
2005	245986	31.8	32.1	8.6	0.5	0.4	73.4	20.4	6.3	36.1
2006	278285	29.7	31.9	8.6	0.5	0.4	71.1	21.9	7.0	38.4
2007	334953	29.0	31.6	8.9	0.5	0.5	70.5	22.0	7.5	39.4
2008	366573	28.8	32.3	8.4	0.4	0.4	70.4	22.2	7.5	38.9
2009	293688	32.8	34.1	8.1	0.4	0.4	75.7	18.9	5.3	33.1
2010	322167	30.2	33.5	8.1	0.4	0.3	72.5	21.0	6.6	36.4
2011	386534	28.1	33.3	7.9	0.3	0.3	70.1	22.6	7.3	38.5

Source: authors' calculations on WIOD data.

Table A2.a

Manufacturing exports: foreign-value-added content, including and excluding commodities inputs

(as a percentage of manufacturing gross exports)

	France			Germany			Italy			Spain		
Year	Foreign-value-added content of exports (FVAX)	FVAX originated in commodities sector abroad (FVAXcomm)	FVAX net of FVAXcomm	Foreign-value-added content of exports (FVAX)	FVAX originated in commodities sector abroad (FVAXcomm)	FVAX net of FVAXcomm	Foreign-value-added content of exports (FVAX)	FVAX originated in commodities sector abroad (FVAXcomm)	FVAX net of FVAXcomm	Foreign-value-added content of exports (FVAX)	FVAX originated in commodities sector abroad (FVAXcomm)	FVAX net of FVAXcomm
1995	17.5	1.1	16.4	14.4	0.9	13.5	17.1	1.3	15.7	19.5	1.7	17.9
1996	17.9	1.2	16.7	14.7	1.0	13.7	15.4	1.4	14.0	19.2	1.9	17.3
1997	18.5	1.1	17.4	15.7	1.0	14.7	15.9	1.3	14.6	20.3	2.0	18.3
1998	19.3	0.9	18.3	15.9	0.8	15.1	15.9	1.0	14.9	21.2	1.5	19.7
1999	18.7	1.2	17.5	16.6	1.0	15.7	15.8	1.3	14.5	22.0	2.1	20.0
2000	20.8	2.0	18.8	18.1	1.6	16.6	18.1	2.2	15.9	25.1	3.3	21.8
2001	20.4	1.8	18.6	18.2	1.5	16.7	17.8	2.0	15.8	23.6	2.9	20.7
2002	19.9	1.7	18.2	17.5	1.4	16.0	17.1	1.9	15.2	22.9	2.5	20.3
2003	19.4	1.7	17.8	17.6	1.4	16.2	17.1	1.9	15.2	22.6	2.5	20.1
2004	20.1	2.0	18.2	18.3	1.7	16.7	17.7	2.2	15.5	23.4	3.0	20.4
2005	21.1	2.8	18.4	19.5	2.3	17.2	18.8	3.1	15.7	24.0	4.1	19.9
2006	21.9	3.2	18.7	20.6	2.9	17.7	20.6	3.8	16.7	25.8	5.3	20.5
2007	22.2	3.0	19.2	21.0	2.6	18.4	20.9	3.7	17.2	26.2	5.1	21.1
2008	23.2	4.0	19.2	21.7	3.3	18.5	21.4	4.5	16.9	26.3	6.6	19.7
2009	21.3	2.7	18.6	20.0	2.1	17.9	18.8	3.8	15.0	22.8	4.7	18.1
2010	23.2	2.8	20.4	21.4	2.3	19.1	21.9	4.9	17.0	24.9	5.6	19.3
2011	24.3	3.1	21.2	22.0	2.3	19.7	22.7	5.0	17.7	26.8	6.9	19.9

Source: authors calculations on WIOD data.
Notes: “commodities” are identified with the “mining and quarrying” sector.

Table A2.b

Exports of services: foreign-value-added content, including and excluding commodities inputs

(as a percentage of gross exports of services)

	France			Germany			Italy			Spain		
Year	Foreign-value-added content of exports (FVAX)	FVAX originated in commodities sector abroad (FVAXcomm)	FVAX net of FVAXcomm	Foreign-value-added content of exports (FVAX)	FVAX originated in commodities sector abroad (FVAXcomm)	FVAX net of FVAXcomm	Foreign-value-added content of exports (FVAX)	FVAX originated in commodities sector abroad (FVAXcomm)	FVAX net of FVAXcomm	Foreign-value-added content of exports (FVAX)	FVAX originated in commodities sector abroad (FVAXcomm)	FVAX net of FVAXcomm
1995	8.2	0.5	7.7	5.2	0.3	4.9	7.5	0.5	7.0	7.0	0.8	6.3
1996	8.5	0.5	7.9	5.3	0.3	5.0	6.8	0.5	6.3	7.5	1.0	6.6
1997	8.7	0.5	8.2	5.9	0.4	5.6	7.0	0.5	6.5	7.7	0.9	6.8
1998	7.9	0.4	7.5	6.0	0.3	5.8	7.2	0.4	6.9	7.8	0.6	7.2
1999	7.4	0.5	6.8	6.1	0.3	5.7	7.1	0.4	6.7	8.1	0.8	7.3
2000	9.0	1.0	8.0	7.3	0.7	6.6	7.9	0.8	7.1	9.8	1.6	8.2
2001	8.9	0.8	8.1	7.2	0.6	6.6	7.7	0.7	7.0	9.1	1.3	7.9
2002	8.4	0.8	7.6	7.1	0.5	6.6	7.1	0.6	6.5	8.7	1.1	7.6
2003	7.8	0.7	7.1	6.9	0.6	6.3	6.9	0.6	6.3	8.2	1.0	7.2
2004	7.7	0.9	6.8	7.0	0.7	6.3	7.5	0.8	6.8	8.6	1.3	7.4
2005	8.1	1.1	7.0	7.4	0.9	6.5	8.1	1.1	7.0	9.6	1.9	7.8
2006	8.4	1.3	7.1	8.2	1.1	7.0	8.9	1.4	7.4	10.1	2.1	8.1
2007	8.4	1.2	7.2	8.4	1.0	7.3	8.7	1.3	7.4	9.6	1.7	8.0
2008	8.5	1.5	7.0	8.6	1.4	7.2	9.0	1.6	7.4	10.3	2.0	8.2
2009	8.1	1.1	7.1	8.0	0.9	7.1	7.9	1.3	6.6	8.8	1.5	7.3
2010	7.7	1.0	6.7	8.9	1.0	7.9	9.4	1.8	7.6	10.1	1.9	8.2
2011	8.3	1.2	7.1	9.1	1.0	8.1	9.7	1.9	7.8	10.3	2.1	8.3

Source: authors calculations on WIOD data.
Notes: “commodities” are identified with the “mining and quarrying” sector.

Table A3.a

Impact on French exports and GDPX of a 10 % increase in selected areas' final internal demand

(as a percentage of GDP, except for GDPX-intensities)

Countries and areas:	1995			1999			2007			2011		
	Exports	GDPX	GDPX-intensity	Exports	GDPX	GDPX-intensity	Exports	GDPX	GDPX-intensity	Exports	GDPX	GDPX-intensity
EU countries	**1.20**	**0.95**	**0.795**	**1.46**	**1.13**	**0.777**	**1.37**	**0.99**	**0.725**	**1.17**	**0.82**	**0.698**
Euro area	0.95	0.75	0.795	1.09	0.85	0.777	1.01	0.73	0.725	0.88	0.61	0.698
of which: *France*	*0.04*	*0.03*	*0.791*	*0.04*	*0.03*	*0.776*	*0.05*	*0.03*	*0.716*	*0.04*	*0.03*	*0.687*
Germany	*0.33*	*0.26*	*0.785*	*0.34*	*0.26*	*0.770*	*0.30*	*0.21*	*0.704*	*0.28*	*0.19*	*0.677*
Italy	*0.19*	*0.15*	*0.799*	*0.22*	*0.17*	*0.782*	*0.19*	*0.14*	*0.737*	*0.16*	*0.11*	*0.703*
Spain	*0.12*	*0.10*	*0.793*	*0.19*	*0.14*	*0.765*	*0.19*	*0.14*	*0.724*	*0.15*	*0.11*	*0.721*
EU not belonging to the Euro area	0.25	0.20	0.796	0.37	0.28	0.778	0.36	0.26	0.726	0.29	0.20	0.698
Eastern EU countries	*0.03*	*0.03*	*0.808*	*0.06*	*0.05*	*0.785*	*0.10*	*0.07*	*0.721*	*0.08*	*0.06*	*0.695*
Other EU countries	*0.22*	*0.17*	*0.794*	*0.30*	*0.23*	*0.776*	*0.26*	*0.19*	*0.728*	*0.20*	*0.14*	*0.700*
Extra EU countries	**1.08**	**0.87**	**0.807**	**1.10**	**0.87**	**0.790**	**1.21**	**0.89**	**0.732**	**1.42**	**1.02**	**0.720**
Australasia net of China	0.17	0.14	0.811	0.16	0.13	0.799	0.15	0.11	0.742	0.16	0.12	0.717
of which: *Japan*	*0.09*	*0.07*	*0.815*	*0.08*	*0.06*	*0.797*	*0.06*	*0.04*	*0.744*	*0.06*	*0.04*	*0.708*
China	0.03	0.03	0.787	0.04	0.03	0.772	0.08	0.06	0.722	0.16	0.12	0.728
Americas	0.32	0.27	0.826	0.42	0.34	0.801	0.36	0.27	0.740	0.36	0.26	0.727
of which: *United States*	*0.26*	*0.22*	*0.828*	*0.34*	*0.27*	*0.801*	*0.28*	*0.21*	*0.740*	*0.25*	*0.18*	*0.722*
Russia and Turkey	0.04	0.03	0.797	0.05	0.04	0.768	0.08	0.06	0.712	0.10	0.07	0.703
Row	0.51	0.41	0.796	0.43	0.33	0.779	0.53	0.39	0.728	0.64	0.46	0.718
Total	**2.28**	**1.83**	**0.801**	**2.55**	**2.00**	**0.782**	**2.58**	**1.88**	**0.729**	**2.58**	**1.83**	**0.710**
Memo item: BRIC	0.09	0.07	0.804	0.10	0.08	0.791	0.18	0.13	0.729	0.29	0.21	0.729

Source: authors' calculations on WIOD data.

Table A3.b

Impact on German exports and GDPX of a 10 % increase in selected areas' final internal demand

(as a percentage of GDP, except for GDPX-intensities)

Countries and areas:	1995			1999			2007			2011		
	Exports	GDPX	GDPX-intensity	Exports	GDPX	GDPX-intensity	Exports	GDPX	GDPX-intensity	Exports	GDPX	GDPX-intensity
EU countries	**1.29**	**1.06**	**0.821**	**1.60**	**1.27**	**0.789**	**2.39**	**1.71**	**0.714**	**2.01**	**1.42**	**0.706**
Euro area	0.93	0.77	0.821	1.12	0.89	0.790	1.60	1.14	0.714	1.37	0.97	0.706
of which: *France*	*0.21*	*0.17*	*0.819*	*0.24*	*0.19*	*0.788*	*0.33*	*0.23*	*0.708*	*0.33*	*0.23*	*0.696*
Germany	*0.08*	*0.07*	*0.817*	*0.09*	*0.07*	*0.789*	*0.14*	*0.10*	*0.706*	*0.14*	*0.09*	*0.698*
Italy	*0.17*	*0.14*	*0.820*	*0.22*	*0.17*	*0.786*	*0.30*	*0.21*	*0.714*	*0.24*	*0.17*	*0.702*
Spain	*0.08*	*0.07*	*0.822*	*0.13*	*0.10*	*0.790*	*0.23*	*0.16*	*0.709*	*0.14*	*0.10*	*0.717*
EU not belonging to the Euro area	0.36	0.29	0.819	0.48	0.38	0.788	0.79	0.56	0.716	0.64	0.45	0.704
Eastern EU countries	*0.08*	*0.07*	*0.825*	*0.14*	*0.11*	*0.790*	*0.30*	*0.21*	*0.712*	*0.26*	*0.18*	*0.704*
Other EU countries	*0.27*	*0.22*	*0.817*	*0.34*	*0.27*	*0.787*	*0.49*	*0.35*	*0.718*	*0.38*	*0.27*	*0.703*
Extra EU countries	**1.13**	**0.93**	**0.821**	**1.35**	**1.08**	**0.797**	**2.37**	**1.71**	**0.724**	**2.59**	**1.87**	**0.721**
Australasia net of China	0.22	0.18	0.830	0.20	0.16	0.802	0.31	0.23	0.730	0.30	0.22	0.715
of which: *Japan*	*0.09*	*0.07*	*0.821*	*0.08*	*0.07*	*0.788*	*0.10*	*0.07*	*0.725*	*0.09*	*0.07*	*0.710*
China	0.04	0.03	0.818	0.06	0.05	0.796	0.21	0.15	0.721	0.38	0.27	0.710
Americas	0.32	0.26	0.823	0.51	0.40	0.787	0.69	0.50	0.722	0.65	0.47	0.723
of which: *United States*	*0.24*	*0.20*	*0.820*	*0.40*	*0.31*	*0.784*	*0.53*	*0.38*	*0.721*	*0.45*	*0.32*	*0.722*
Russia and Turkey	0.07	0.06	0.819	0.07	0.05	0.788	0.20	0.14	0.705	0.22	0.15	0.689
Row	0.48	0.39	0.817	0.51	0.41	0.806	0.96	0.70	0.729	1.04	0.76	0.734
Total	**2.42**	**1.99**	**0.821**	**2.95**	**2.34**	**0.793**	**4.76**	**3.42**	**0.719**	**4.59**	**3.28**	**0.714**
Memo item: BRIC	0.14	0.12	0.829	0.15	0.12	0.801	0.45	0.33	0.721	0.67	0.48	0.711

Source: authors' calculations on WIOD data.

Table A3.c

Impact on Italian exports and GDPX of a 10 % increase in selected areas' final internal demand

(as a percentage of GDP, except for GDPX-intensities)

Countries and areas:	1995			1999			2007			2011		
	Exports	GDPX	GDPX-intensity	Exports	GDPX	GDPX-intensity	Exports	GDPX	GDPX-intensity	Exports	GDPX	GDPX-intensity
EU countries	**1.27**	**1.03**	**0.806**	**1.26**	**1.03**	**0.817**	**1.40**	**1.04**	**0.744**	**1.22**	**0.87**	**0.716**
Euro area	1.02	0.82	0.805	0.95	0.78	0.816	1.01	0.75	0.739	0.93	0.66	0.710
of which: *France*	*0.25*	*0.20*	*0.803*	*0.24*	*0.19*	*0.815*	*0.25*	*0.18*	*0.742*	*0.24*	*0.17*	*0.713*
Germany	*0.37*	*0.30*	*0.810*	*0.31*	*0.25*	*0.823*	*0.26*	*0.20*	*0.751*	*0.28*	*0.20*	*0.732*
Italy	*0.02*	*0.02*	*0.799*	*0.03*	*0.02*	*0.813*	*0.04*	*0.03*	*0.733*	*0.03*	*0.02*	*0.706*
Spain	*0.11*	*0.08*	*0.794*	*0.13*	*0.10*	*0.804*	*0.18*	*0.13*	*0.707*	*0.14*	*0.09*	*0.646*
EU not belonging to the Euro area	0.25	0.20	0.810	0.31	0.25	0.820	0.39	0.29	0.758	0.30	0.22	0.733
Eastern EU countries	*0.06*	*0.05*	*0.806*	*0.09*	*0.07*	*0.817*	*0.15*	*0.11*	*0.746*	*0.13*	*0.09*	*0.725*
Other EU countries	*0.19*	*0.15*	*0.811*	*0.22*	*0.18*	*0.822*	*0.24*	*0.18*	*0.765*	*0.17*	*0.12*	*0.739*
Extra EU countries	**1.19**	**0.97**	**0.815**	**1.09**	**0.90**	**0.824**	**1.46**	**1.09**	**0.747**	**1.62**	**1.19**	**0.735**
Australasia net of China	0.21	0.17	0.825	0.16	0.14	0.833	0.19	0.15	0.765	0.19	0.14	0.739
of which: *Japan*	*0.10*	*0.08*	*0.823*	*0.08*	*0.07*	*0.831*	*0.07*	*0.05*	*0.768*	*0.06*	*0.05*	*0.739*
China	0.05	0.04	0.809	0.04	0.03	0.818	0.09	0.07	0.750	0.17	0.13	0.755
Americas	0.37	0.30	0.817	0.43	0.36	0.824	0.42	0.32	0.749	0.40	0.29	0.732
of which: *United States*	*0.28*	*0.23*	*0.819*	*0.35*	*0.29*	*0.826*	*0.32*	*0.24*	*0.755*	*0.27*	*0.19*	*0.728*
Russia and Turkey	0.08	0.06	0.800	0.05	0.04	0.808	0.14	0.10	0.750	0.19	0.14	0.739
Row	0.49	0.40	0.813	0.40	0.33	0.824	0.62	0.46	0.740	0.68	0.49	0.729
Total	**2.46**	**1.99**	**0.811**	**2.36**	**1.93**	**0.821**	**2.85**	**2.13**	**0.746**	**2.84**	**2.07**	**0.727**
Memo item: BRIC	0.15	0.12	0.811	0.11	0.09	0.816	0.23	0.18	0.755	0.37	0.28	0.755

Source: authors' calculations on WIOD data.

Table A3.d

Impact on Spanish exports and GDPX of a 10 % increase in selected areas' final internal demand

(as a percentage of GDP, except for GDPX-intensities)

Countries and areas:	1995			1999			2007			2011		
	Exports	GDPX	GDPX-intensity	Exports	GDPX	GDPX-intensity	Exports	GDPX	GDPX-intensity	Exports	GDPX	GDPX-intensity
EU countries	**1.22**	**0.96**	**0.789**	**1.52**	**1.15**	**0.762**	**1.45**	**1.03**	**0.709**	**1.43**	**1.01**	**0.704**
Euro area	1.02	0.81	0.789	1.21	0.93	0.762	1.12	0.79	0.708	1.14	0.79	0.697
of which: *France*	*0.30*	*0.24*	*0.775*	*0.34*	*0.26*	*0.749*	*0.31*	*0.22*	*0.690*	*0.33*	*0.22*	*0.670*
Germany	*0.27*	*0.22*	*0.791*	*0.30*	*0.23*	*0.769*	*0.23*	*0.16*	*0.700*	*0.25*	*0.18*	*0.710*
Italy	*0.15*	*0.12*	*0.782*	*0.19*	*0.14*	*0.756*	*0.18*	*0.13*	*0.716*	*0.19*	*0.14*	*0.714*
Spain	*0.01*	*0.01*	*0.787*	*0.02*	*0.02*	*0.755*	*0.03*	*0.02*	*0.700*	*0.03*	*0.02*	*0.692*
EU not belonging to the Euro area	0.20	0.15	0.790	0.30	0.23	0.760	0.33	0.23	0.713	0.29	0.21	0.729
Eastern EU countries	*0.02*	*0.02*	*0.801*	*0.04*	*0.03*	*0.774*	*0.08*	*0.06*	*0.720*	*0.09*	*0.07*	*0.746*
Other EU countries	*0.17*	*0.14*	*0.789*	*0.26*	*0.19*	*0.757*	*0.25*	*0.18*	*0.711*	*0.20*	*0.15*	*0.722*
Extra EU countries	**0.69**	**0.55**	**0.799**	**0.77**	**0.59**	**0.766**	**0.98**	**0.69**	**0.699**	**1.24**	**0.86**	**0.697**
Australasia net of China	0.09	0.07	0.796	0.09	0.07	0.775	0.09	0.07	0.714	0.11	0.07	0.705
of which: *Japan*	*0.04*	*0.04*	*0.797*	*0.04*	*0.03*	*0.782*	*0.03*	*0.02*	*0.730*	*0.04*	*0.03*	*0.715*
China	0.02	0.02	0.819	0.03	0.03	0.824	0.10	0.08	0.799	0.08	0.06	0.699
Americas	0.18	0.14	0.796	0.25	0.20	0.771	0.27	0.18	0.657	0.38	0.26	0.669
of which: *United States*	*0.13*	*0.10*	*0.800*	*0.18*	*0.14*	*0.777*	*0.19*	*0.12*	*0.658*	*0.28*	*0.19*	*0.672*
Russia and Turkey	0.03	0.02	0.796	0.04	0.03	0.737	0.08	0.05	0.672	0.12	0.08	0.698
Row	0.37	0.30	0.800	0.36	0.28	0.758	0.44	0.31	0.705	0.55	0.39	0.715
Total	**1.91**	**1.51**	**0.793**	**2.29**	**1.75**	**0.763**	**2.43**	**1.72**	**0.705**	**2.67**	**1.87**	**0.701**
Memo item: BRIC	0.06	0.05	0.797	0.08	0.06	0.785	0.18	0.14	0.746	0.19	0.13	0.697

Source: authors' calculations on WIOD data.

Table A4

Domestic value added in exports by sector of origin: 2011

(percentage distribution of GDPX across domestic origin sectors; percentage points)

Exporting macro-sectors: / Sector of origin of DVA:	Germany			France			Italy			Spain		
	All goods and services	Manufac-turing	Services	All goods and services	Manufac-turing	Services	All goods and services	Manufac-turing	Services	All goods and services	Manufac-turing	Services
Raw materials	**4.3**	**2.8**	**1.0**	**6.7**	**4.1**	**0.6**	**5.2**	**4.2**	**1.6**	**9.0**	**6.2**	**1.9**
Refined oil and electricity	0.8	0.9	0.5	1.5	1.8	0.5	0.7	0.9	0.2	2.0	2.7	0.4
Traditional sectors	8.1	9.7	0.6	8.7	11.1	0.9	13.6	16.6	1.8	11.1	15.1	2.1
Chemicals, rubber and plastics	9.2	11.1	0.2	7.0	9.1	0.1	6.3	7.9	0.4	8.1	11.7	0.3
Metal products	8.6	10.4	0.3	5.9	7.7	0.2	9.4	11.7	0.6	7.5	10.7	0.4
Machinery and electrical equipment	17.5	21.2	0.4	8.0	10.4	0.2	13.0	16.2	0.7	5.6	8.1	0.3
Transport equipment	9.1	11.0	0.2	6.0	8.0	0.1	3.1	3.9	0.2	5.7	8.4	0.1
Manufacturing	**53.2**	**64.2**	**2.2**	**37.2**	**48.2**	**2.0**	**46.1**	**57.1**	**4.0**	**40.0**	**56.7**	**3.6**
Construction	**0.8**	**0.6**	**0.6**	**0.7**	**0.7**	**0.6**	**1.4**	**1.2**	**1.6**	**1.5**	**1.3**	**1.7**
Trade	8.3	8.0	10.7	10.9	12.6	4.6	13.0	11.3	21.3	10.6	12.4	6.9
Trasport services	6.1	3.0	24.5	8.7	3.9	29.6	6.8	5.2	14.5	10.0	5.4	23.9
Financial services and real estate	6.4	5.3	13.0	8.1	7.2	12.7	9.5	7.4	19.1	7.9	5.8	14.6
Renting and other business activities	16.4	12.6	38.5	22.1	18.9	38.7	13.0	9.6	28.8	14.2	7.6	34.2
Other private services	1.4	0.7	5.1	2.5	1.8	5.3	2.9	2.3	5.3	2.7	1.9	5.2
Pubblic administration	3.0	2.8	4.5	3.1	2.5	5.9	2.1	1.7	3.9	4.1	2.9	8.1
Services	**41.7**	**32.4**	**96.3**	**55.4**	**47.0**	**96.8**	**47.2**	**37.5**	**92.9**	**49.5**	**35.8**	**92.8**
Gross exports (millions of USD)	*1602979*	*1367700*	*191024*	*691460*	*554565*	*104033*	*596637*	*493166*	*90789*	*386534*	*286247*	*80733*

Source: authors' calculations on WIOD data.

Notes: sectors are defined as follows starting from those considered in WIOD tables:

Raw materials: Agriculture, Hunting, Forestry and Fishing; Mining and Quarrying.

Refined oil and electricity: Coke, Refined Petroleum and Nuclear Fuel; Electricity, Gas and Water Supply.

Traditional sectors: Food, Beverages and Tobacco; Textiles and Textile Products; Leather, Leather and Footwear; Wood and Products of Wood and Cork; Pulp, Paper, Printing and Publishing; Other Non-Metallic Mineral; Manufacturing not elsewhere classified; Recycling.

Chemicals, rubber and plastics: Chemicals and Chemical Products; Rubber and Plastics.

Metal products: Basic Metals and Fabricated Metal.

Machinery and electrical equipment: Machinery not elsewhere classified; Electrical and Optical Equipment.

Transport equipment: Transport Equipment.

Construction: Construction.

Trade: Sale, Maintenance and Repair of Motor Vehicles and Motorcycles; Retail Sale of Fuel; Wholesale Trade and Commission Trade, Except of Motor Vehicles and Motorcycles; Retail Trade, Except of Motor Vehicles and Motorcycles; Repair of Household Goods.

Transport services: Inland Transport; Water Transport; Air Transport; Other Supporting and Auxiliary Transport Activities; Activities of Travel Agencies.

Financial services and real estate: Financial Intermediation; Real Estate Activities.

Renting of machinery and equipment: Renting of Machinery and Equipment and Other Business Activities.

Other private services: Hotels and Restaurants; Post and Telecommunications.

Public administration: Public Administration and Defence; Compulsory Social Security; Education; Health and Social Work; Other Community, Social and Personal Services; Private Households with Employed Persons.

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