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COMPETITIVENESS RESEARCH NETWORK: FIRST YEAR RESULTS

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CompNet The Competitiveness Research Network

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EXECUTIVE SUMMARY

This interim report[1] summarises the main findings of the Competitiveness Research Network (CompNet) after one year of existence.

The Network is organized in three workstreams related to: (i) aggregate measures of competitiveness; (ii) firm-level studies; and (iii) global value chains (GVCs). The main objectives of the Network are to improve the existing frameworks and indicators of competitiveness across all dimensions (macro, micro and cross-border) and establish a more solid connection between identified competitiveness drivers and resulting outcomes (trade, aggregate productivity, employment, growth and essentially welfare), in order to support the design of adequate policies.

To date and in line with plans, the Network has improved the existing competitiveness indicators across all three dimensions and has integrated them into a diagnostic toolkit designed to be used for competitiveness assessment on a regular basis. Several new indicators have already been fed into the country monitoring process in various Eurosystem and ECB reports[2] and also shared with the European Commission, as part of an ongoing cross-fertilisation of ideas aimed at supporting the EU surveillance framework.

On the aggregate, macro side, CompNet research points to the important role of additional "non-price" factors in explaining trade results within the global economy. To this end, CompNet is adding more sophisticated indicators to the ones traditionally used for policy analysis. Such indicators are derived based on detailed six-digit product-level statistics (e.g. about 5,000 product categories) and include:

- *Non-price competitiveness*. Among others, one set of indicators disentangle how much of the trade balance is due to price versus non-price factors, with powerful implications when an external adjustment is needed. Another set of indicators allows adjusting traditional price indicators with quality and taste. All the above analyses help explaining the apparent disconnect between developments in export market shares and in competitiveness indicators based only on prices and costs;

- *Product and geographical specialization.* In a joint CompNet project, the Banque de France and the World Bank have developed a novel econometric-based methodology that ascribes export market shares growth to specialisation in high-growth sectors, orientation to more dynamic destinations or to a pure competitiveness effect; the latter generally accounts for most of the dynamics of export market shares in European countries;

- *Competitiveness pressures.* Given the proliferation of low-cost exporters from developing countries, CompNet has developed a "barometer" of the competitive pressures stemming from competitors on the same market. The results suggest that euro area countries stand in direct competition with the big emerging markets in over 70% of all possible product markets;

1 This report was prepared by Elena Bobeica and Filippo di Mauro. It includes inputs and research results from C. Altomonte (Bocconi University), C. Osbat (ECB), E. Bartelsman (Vrije Universiteit Amsterdam), J. Amador (Banco de Portugal), J. Wörz (Oesterreichische Nationalbank), K. Benkovskis (Latvijas Banka), A. Berthou, G. Gaulier, V. Vicard and S. Zignago (Banque de France), P. Tello (Banco de España), R. Cappariello (Banca d'Italia), H. Vandenbussche (European Commission), P. S. Esteves (Banco de Portugal). Additional inputs and comments were provided by J. Haltiwanger (University of Maryland), G. Barba Navaretti (University of Milan), I. Grilo (European Commission), K. Staehr (Eesti Pank), S. Araujo and K. de Backer (Organisation for Economic Co-operation and Development), G. Momchilov (Bulgarian National Bank), K. Galuscak (Česká Národní Banka) and T. Lalinský (Národná banka Slovenska) and a large number of CompNet contributors (see Appendix 4).

2 For example, some indicators were used for the Surveillance Report (price/non-price decomposition of trade balances, extensive margins, shift-share analysis) and for the report of the Working Group on Econometric Modelling on "Competitiveness and external imbalances within the euro area", *Occasional Paper Series*, No 139, ECB, December 2012.

- *Extensive and intensive margins*. CompNet research shows that EU countries export growth resulted from a deepening of existing trade relationships rather than from approaching new sectoral or geographical markets.

Econometric estimations of trade performance confirm that over and above cost factors, there is a large explanatory role for demand, capital flows and imbalances between the tradable and non-tradable sectors.

At the micro level, CompNet early research has confirmed the crucial role of firm-level factors (such as size, ownership and technological capacity) in understanding the drivers of competitiveness, the determinants of productivity and the role of resource misallocation. In order to make progress on this field, CompNet has created an active network of 13 country teams which are running independently a common algorithm to compute indicators related to sectoral labour and total factor productivity dynamics; this approach was chosen in order to deal with the problem of firm-level data confidentiality.

The two main stylised facts highlighted by these indicators are the following:

- *There is a significant heterogeneity in the productivity of firms across sectors, but even more so within sectors*; one powerful implication is that structural policies should aim at exploiting the shape of the productivity distribution. For instance, policies aimed at switching resources from non-tradable to tradable sectors should also be complemented with others aimed at improving resource reallocation within the tradable sector;

- *There is a positive relationship between labour productivity and size* and usually export activities are concentrated among a limited number of firms that are larger and exhibit a higher productivity.

These results imply that there is a substantial potential to boost overall productivity by fostering reallocation of resources within and across industries over and above enhancing productivity of incumbent firms.

Finally, at the cross-border level, CompNet research points to the importance of understanding the implications of integration into global value chains for the overall assessment of competitiveness. To this purpose, CompNet has functioned as a hub across databases and methodologies, by collaborating with a number of institutions that have conducted advanced research on constructing appropriate databases (e.g. the World Trade Organization, the Organisation for Economic Co-operation and Development and the United States International Trade Commission). The main databases that CompNet members can currently make use of are provided by the OECD and the WTO (the TIVA project) and by the consortium funded by the European Union that has set up the World Input-Output Database (WIOD).

So far, CompNet research indicates that European countries are highly and increasingly integrated into GVCs. Most of them have moved upstream along the production chain, which is consistent with the general increase in the length of GVCs and with the outsourcing phenomenon. These results derive from a set of indicators CompNet members are developing with a focus on European countries, namely:

- *Decomposition of the value added embodied in national exports*, which is particularly relevant given that traditional gross trade statistics have become less informative with the increased import content of exports;

- *Degree of integration into GVCs*, a measure that takes into account both the use of foreign inputs for own exports and the supply of intermediates to other countries' exports;

- *Position in GVCs* or relative distance to final demand.

In the next phase, the Network is planning to refine the competitiveness indicators across all three dimensions, most notably by fully exploiting the newly created firm-level indicator database. *Furthermore, several projects are ongoing to connect determinants of competitiveness with the most relevant outcomes* (trade, growth and welfare), using contemporaneously information coming from micro, macro and cross-border level.

The ultimate objective is to build a comprehensive framework for competitiveness assessment which provides a more solid foundation for policy advice.

INTRODUCTION

Persistent losses in competitiveness have generally been identified as one of the fundamental problems behind the recent EU crisis. In order to address such losses and set the stage for stronger and more sustainable growth, it is essential to accurately assess the drivers behind the competitive position of EU countries in the global economy within a multidimensional framework.

To this end, the Governing Council of the ECB approved the creation of the Competitiveness Research Network (CompNet)[3] in March 2012, with the following mandate:

- in a first stage, the Network will improve the existing frameworks and indicators of competitiveness in all dimensions (macro, micro and cross-border);

- in a following stage, the Network will establish a more solid connection between identified competitiveness drivers and resulting outcomes (trade, aggregate productivity, employment, growth and essentially welfare) also by building a bridge between micro and macro analysis, in order to support the design of adequate policies.

The Network was built on the enormous amount of knowledge and research available within the NCBs and the ECB. Within the Eurosystem, common work on competitiveness had already started in earnest in 2004 in preparation for the Structural Issues Report entitled "Competitiveness and the export performance of the euro area". The topic was developed by a number of ECB Occasional Papers, such as di Mauro and Forster (2008), Dieppe et al. (2012) and Orszaghova et al. (2013). Individual member states also invested a lot in the topic (see, for example, the Latvian Competitiveness Report[4]). Subsequently, the existing research agendas were put together under the umbrella of CompNet, which provides a forum where the different approaches and measures of competitiveness are discussed, further developed and eventually cross-reconciled in order to attain a broad-based synthetic assessment of competitiveness.

Due to the strong interest in the topic, the Network has been growing and is currently composed of about 150 economists from the European System of Central Banks, several international organisations (the International Monetary Fund, the World Bank, the Organisation for Economic Co-operation and Development and the European Commission), universities and think-tanks[5], as well as a number of non-European central banks (those of Argentina, Peru and Turkey) and organisations (e.g. the US International Trade Commission). The CompNet ongoing research pipeline currently includes one large joint cross-country project involving gathering of micro data and about 140 individual projects. CompNet research papers are published in the ECB CompNet Working Paper series, as well as in the Working Paper series of contributing NCBs and other institutions. So far, 2 papers have already been published as ECB working papers and 6 others are forthcoming in the next weeks.

The rest of this report is structured as follows: the next section gives an overview of CompNet's approach to measuring competitiveness, Sections 2 to 4 summarise the work of each workstream, and Section 5 concludes, laying out the road ahead.

3 The objectives of CompNet, as well as information on the events, presentations and speeches, are available on the ECB website under the following link: http://www.ecb.int/home/html/researcher_compnet.en.html. See also Appendix 5 in this report.

4 The Latvian Competitiveness Report 2011, commissioned by the State Chancellery of the Republic of Latvia, was prepared by the Stockholm School of Economics in Riga: http://www.sseriga.edu/en/research/lcr/

5 Scholars participating in the Network are affiliated to: Bruegel, Vienna Institute for International Economic Studies (WIIW), Bocconi University, Centro Studi Luca d'Agliano, Hungarian Academy of Sciences, Peterson Institute for International Economics, Stanford University, University of Maryland, University of Milan, University of Nottingham, University Pompeu Fabra and Vrije Universiteit.

I ASSESSING COMPETITIVENESS: THE APPROACH OF COMPNET

Macroeconomic considerations have traditionally been the core element of competitiveness assessment. Macro indicators, such as unit labour costs (ULCs) or current account deficits, are both easy to communicate and related to the macroeconomic instruments that generally policy-makers can avail themselves of. However, in light of the renewed focus on growth, there is a need for a broader and more precise assessment of competitiveness.

First, competitiveness assessment should be complemented by considering the firm component. As Paul Krugman (1996) stressed, countries do not compete, firms do. Aggregate performance depends strongly on firm-level factors such as size, ownership and technological capacity.

Second, in the past decade, firm behaviour has been characterised by increasing international fragmentation of production. As a consequence, the degree of integration into global value chains, increasing trade in intermediates, and specialisation in low or higher value-added tasks, have made a noticeable imprint on the overall competitiveness assessment.

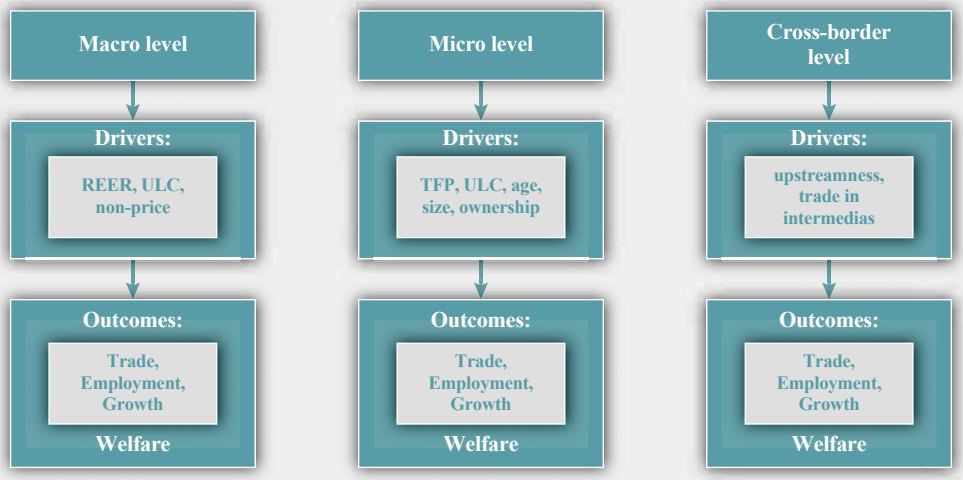
Against this background, the main research question that CompNet is addressing is how to bridge the gap between all relevant levels of competitiveness analysis (macro, micro and cross-border), while providing a quantitative nexus between drivers and outcomes. Accordingly, the Network functions based on three workstreams related to: (i) aggregate measures of competitiveness (country, sector and product level); (ii) firm-level studies; and (iii) global value chains.

The aim of the Network is consistent with a more comprehensive definition of competitiveness, in line with the one already stated by ECB President Mario Draghi (2012): "a competitive economy, in essence, is one in which institutional and macroeconomic conditions allow productive firms to thrive. In turn, the development of these firms supports the expansion of employment, investment and trade." A similar concept is elaborated e.g. by Altomonte et al. (2011a): competitiveness is "the ability of firms in a given country – not of the country itself – to mobilise and efficiently employ (also beyond the country's borders) the productive resources required to offer goods and services. The factors affecting this ability range from the firm-specific (such as the sector of activity, size, technology and so on) to the macro/institutional (e.g. price/cost structure, investment environment and so on)". These definitions point to the fact that competitiveness is not limited to price/cost advantages, but incorporates at least three other main elements: firm-level factors with an emphasis on productivity, structural/macroeconomic factors and a link to the ultimate goal of welfare.

The innovation that CompNet is bringing to the research on competitiveness lies in its holistic approach, whereby the three levels mentioned above, which so far have been mostly considered separately, are linked together, as suggested by economic theory. More precisely, as shown in Chart 1, the previous literature[6] has mostly focused on only one dimension of competitiveness, sporadically allowing for the interlinkages between the three dimensions. On the macro side, previous investigations focused mostly on cost/price-deflated real exchange rates, treating other factors as an unidentified residual. At the firm-level, studies have been mostly limited to detailed assessments of individual country cases. Finally, with regard to cross-border analyses, studies have looked at specific issues (e.g. the impact of the internationalisation of production on labour demand and foreign direct investment (FDI), or the implications of trade negotiations), but rarely at the impact on competitiveness.

6 Notable exceptions are contributions related to the work of the European Commission (the report on competitiveness prepared by DG Enterprise and Industry) or of the World Economic Forum in its Global Competitiveness Report 2012-2013. However, these studies stopped short of identifying rigorously the link between the various indicators and the final outcomes of interest, e.g. balanced and sustainable growth.

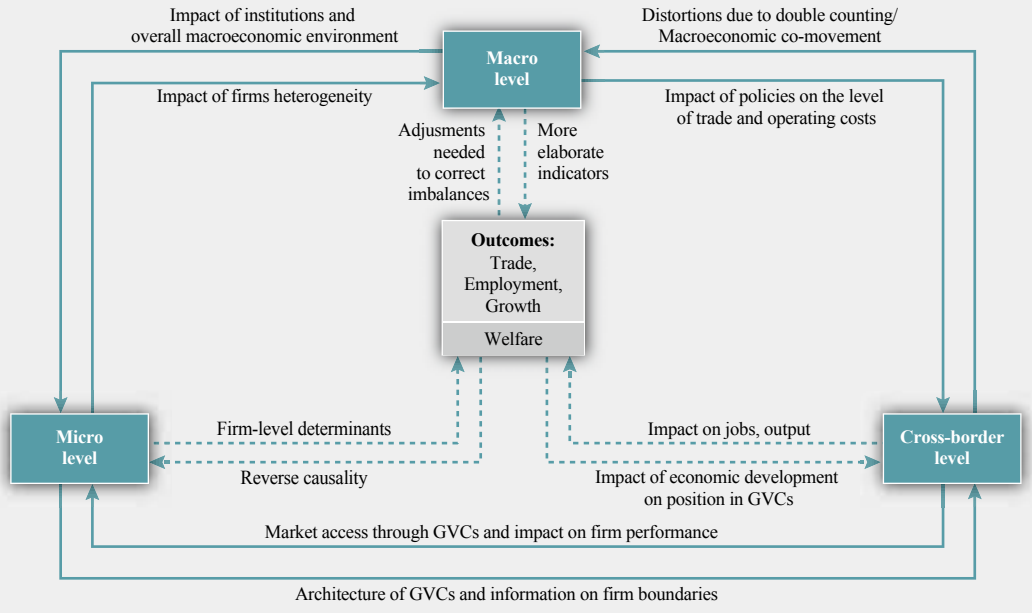
Chart 1 The assessment of competitiveness before CompNet



Source: ECB.

Chart 2 illustrates a set of links across dimensions, for instance: (i) the macro level markedly affects the micro one, as it determines the institutional and overall macroeconomic environment in which firms operate; (ii) the micro level is crucial to understand the drivers and implications of cross-border activity and (iii) the increased integration in GVCs impacts the macro level, as it causes spillovers among countries and gives rise to vulnerabilities to shocks and possible co-movements of macro variables. All three levels of analysis are intertwined and related to the final goal of enhancing welfare.

Chart 2 The CompNet approach to competitiveness assessment



Source: ECB.

2 A MACRO VIEW OF COMPETITIVENESS

2.1 SUBSTANTIATING THE LINK BETWEEN TRADE OUTCOMES AND THEIR DRIVERS

The analysis based on traditional macroeconomic (typically price/cost-based) indicators, however relevant, has proved unable to provide a comprehensive explanation of recent trade developments. This is not surprising considering that, as pointed out for instance by di Mauro et al. (2008), phenomena pertaining to globalisation have reshaped the relationship between trade performance and cost/price factors, with the latter exhibiting a weaker explanatory power for export growth in recent years. In the same vein, the European Commission (2010) tries to disentangle non-price competitiveness factors including the role of quality, intra-industry trade and services as trade facilitators.

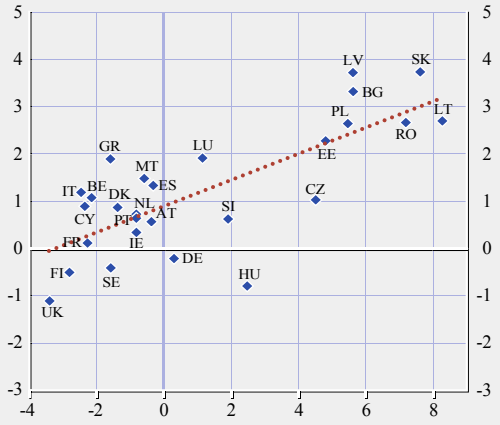
Chart 3 points to the fact that there is not a clear relationship between price competitiveness and export market shares performance. This has also been dubbed the "Spanish paradox", but the disconnect between export shares and relative prices applies to other countries as well. *Going deeper in investigating the drivers of trade, research conducted within CompNet and summarised in this section highlights that additional "non-price" factors play an important role in explaining trade results.*

In particular, Benkovskis and Wörz (2012a and 2012b) provide evidence that partially solves the disconnection puzzle between real appreciation and gains in export market shares in the case of most central and south-eastern European economies. Based on a theoretical model (extending the variety-adjusted import price index developed by Feenstra, 1994), they develop an export price index adjusted by non-price factors using highly disaggregated data. The non-price factor

Chart 3 Export market shares and real effective exchange rates based on export prices (2001 – 2011)

(percentages)

x-axis: export market shares, avg. y-o-y growth
y-axis: REER (export prices) avg. y-o-y growth



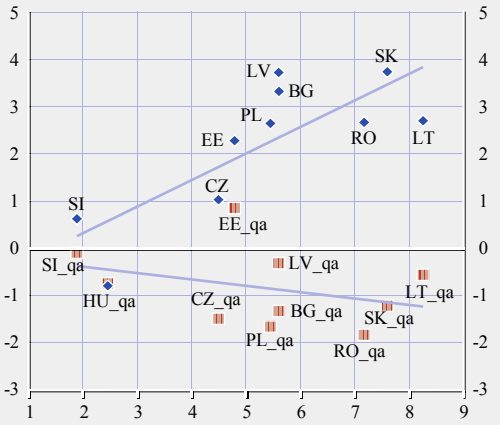
Sources: Eurostat and European Commission.

Chart 4 Export market shares vs. adjusted and non-adjusted relative export prices (2001 – 2011)

(percentages)

x-axis: export market shares, avg. y-o-y growth
y-axis: relative prices, avg. y-o-y growth

REER (based on export prices)
relative export prices adj. for quality



Sources: Eurostat, European Commission, and Benkovskis and Wörz (2012a).

is defined as any tangible or intangible attribute of a good that changes the consumers' valuation of it, and therefore can be attributed both to perceived quality and taste. The adjusted relative export price index actually points to a gain in competitiveness for most of the analysed countries (see Chart 4), which suggests that *traditionally monitored indicators of price competitiveness do not necessarily reflect an accumulation of imbalances, especially for EU Member States that have experienced a process of real convergence towards more developed countries.*

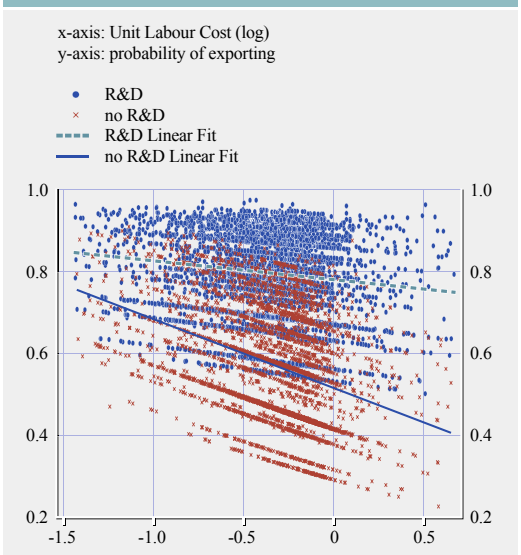
Regarding the broad area of non-price competitiveness, Di Comite et al. (2012) show that quality can be dissociated from taste when considering the firm-level dimension. In their research using Belgian firm/product-level data, the authors show that the price at which a firm sells its goods in a market can generate either a high or a low market share in that market, depending on whether the firm is competing on price or on quality. *Thus, adjusting traditional indicators with non-price factors such as quality and taste can significantly improve the understanding of the trade performance drivers.* In this regard, the European Commission is constructing a dataset of quality indicators at country/product level consistent with previous theoretical work (Vandenbussche, 2012).

An additional insight into the relationship between the ability to export and quality-adjusted cost competitiveness is provided by firm-level data. Altomonte et al. (2012), based on EFIGE[7] firm-level data, show that the relationship between ULCs and the probability of exporting varies significantly depending on whether the firms are relatively well positioned on the quality ladder, namely on whether they engage in R&D activities or not (see Chart 5). For firms engaging in R&D activities, an increase in ULCs does not necessarily affect the ability to export, as non-price factors can make up for the loss in price competitiveness.

More recent CompNet analyses confirm the result that trade performance is not fully explained by cost factors and point to a large role for demand, capital flows and imbalances between the tradable and non-tradable sectors.

Esteves and Rua (2013) argue that, at least for the Portuguese economy, foreign demand and the real exchange rate do not fully explain export developments and point to a role for domestic demand pressures, which is more prominent for short-term dynamics and during recessions. The explanation is rather straightforward: during a domestic recession, firms will try to compensate for the decline in domestic sales through increased efforts to export.

Chart 5 Relationship between ULC and export by R&D activity



Source: Altomonte et al. (2012).

7 EFIGE stands for "European Firms in a Global Economy: internal policies for external competitiveness". The EFIGE survey, funded by the European Commission under the 7th Framework Program, covers a representative sample of some 15,000 firms in seven European countries (Austria, France, Germany, Hungary, Italy, Spain and the United Kingdom). The EFIGE survey was the first one carried out in several European countries focusing on the international operations (trade and production) of individual firms, combined with detailed information on other firm characteristics (governance, labour, technology, finance, markets) as well as balance sheet data.

Apart from their relatively low explanatory power, an additional reason for a cautious interpretation of traditional cost/price competitiveness indicators is put forward by Gabrisch and Staehr (2012). They point out that the *rise in aggregate ULCs in some countries may have been caused by high capital inflows* and argue that capital flows from the European core to the periphery were a cause of the divergence in ULCs between the core countries in northern Europe and the countries in central, eastern and southern Europe prior to the global financial crisis.

Indeed, capital inflows have affected the distribution of resources among tradable and non-tradable sectors. As suggested by Dieppe et al. (2012), *the visible shift of resources and production from the tradable towards the non-tradable sector in countries severely affected by the crisis put downward pressure on total factor productivity (TFP) in the tradable sector.* This calls in principle for monitoring distortions between the tradable and non-tradable sectors and for structural reforms aimed at a more efficient resource allocation within the economy in order to prevent imbalances.

Gaulier and Vicard (2012) make a related point for e.g. France, Spain, Ireland or Portugal. *They stress that ULC growth was largely driven by the growth in price indices of value added in non-tradable sectors.* Exports were largely unaffected, as they respond primarily to foreign demand and exogenous international price changes, while trade deficits opened up due to a large increase in imports, fuelled by fast credit expansion.

The prominent role of imports in driving net trade results was also visible after the onset of the crisis (Bojesteanu Bobeica and Manu, 2012). The subsequent adjustment of external imbalances that occurred in some countries during the first years of the crisis was achieved primarily through demand compression, rather than expenditure switching, with real exchange rates playing little or even a destabilising role, as argued by Lane and Milesi Ferretti (2011). However, in most recent years, current account imbalances improved beyond that implied by cyclical effects and there have been a significant relative price adjustment and an increase in export market shares in most of the deficit countries.

The available empirical and theoretical evidence shows that imports could also affect trade results through their impact on firms' productivity and, consequently, on their exports. The expected impact depends on the type of goods and services imported. Apart from reducing production costs, in the case of intermediate inputs from low-labour cost countries, imports could help firms adopt leading-edge technology or use more varied and higher quality inputs. Fernández et al (2012), based on EFIGE firm-level data, find that Spanish and Italian firms are more likely to import raw materials for production than German and French firms, whose imports are more diversified. This result suggests that differences across countries in terms of the use of imports enhances quality and add a greater value during the production process.

These results from *CompNet research thus point to the need to complement traditional aggregate price and cost competitiveness measures with more refined, non-price, analyses.*

Box 1

HOW PRODUCT-LEVEL STUDIES CAN ENRICH THE ANALYSIS BASED ON MACROECONOMIC MODELS

In the first CompNet working paper, Corbo and Osbat (2012) find a significant degree of heterogeneity in trade elasticities to relative prices between product categories and among countries, which needs to be taken into account in the calibration of macro models. The authors develop a new empirical strategy that aims to overcome the shortcomings of recent studies, drawing on the seminal work of Feenstra (1994). Those studies tend to give biased estimates of trade elasticities; using bootstrap methods, the authors partly correct for the bias of the structural elasticity parameter.

Another useful result refers to the coverage and completeness of the results, as it accounts for a much larger percentage of total trade and production compared with many earlier studies and it covers all EU countries. The product-level elasticities are estimated at the 4-digit ISIC level and the results are then aggregated into macro-level estimates for each country, which are extremely useful for the calibration of macro models to different countries or multi-country groups.

Appendix 1 of this report presents the aggregated results obtained using the bootstrapped elasticities for both imports and exports. The mean is less representative than the mode or the median, as the distribution of the estimates within the product categories tends to be skewed (The Chart below depicts this distribution for the case of Germany).

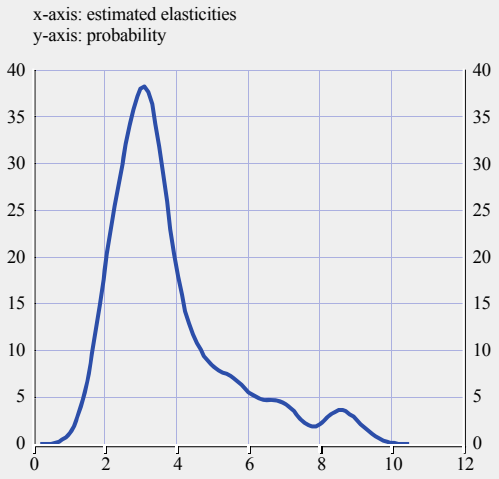
The heterogeneity of the speed of adjustment of trade to changes in international prices across countries is largely driven by the effect of sectoral specialisation.

One direct policy implication is that for each particular country, there are sectors for which trade is substantially less sensitive to price factors, so policy actions aimed at adjusting relative prices (including by adjusting ULC) concentrated in these sectors need to be complemented with measures addressing other issues than prices.

Moreover, the heterogeneity of trade elasticities also relates to the concept of competitiveness, as a low elasticity may be indicative of either high non-price competitiveness, with firms being able to export despite increasing prices, e.g. due to high technological content, or, symmetrically, of very low non-price competitiveness, with firms not being able to export despite falling prices, possibly due to a mismatch with the kind of products that are in demand.

Distribution of import elasticities of substitution across products. The case of Germany

(percentages)



Source: Corbo and Osbat (2012).
Note: Gaussian kernel function approximation of the distribution

2.2 THE DESIGN OF THE MACRO DIAGNOSTIC TOOLKIT

In order to capture more complex dimensions over and above the traditional price/cost-based indicators, CompNet is developing a battery of additional "non-price indicators" aimed at providing a comprehensive view of the competitive position of EU countries. These additional dimensions include: (1) price and non-price competitiveness;[8] (2) product and geographical differentiation; (3) measures of competitiveness pressures; and (4) extensive and intensive margins.

(1) Using a very detailed product-level disaggregation (over 5,000 products on average), Osbat et al. (2012) have disentangled *the role of price and non-price factors in driving the trade balance.* The idea is simple: for example, if German car engines increase their world market share despite being more expensive than those of competitors, the car engine product category is classified as having a non-price "competitiveness premium". By aggregating the export values corresponding to all 5,000 products, the trade balance can be divided into price and non-price contributions, which can be positive or negative in net terms. Chart 6 illustrates the significant negative contribution that price factors played in determining the trade balance in Greece, Cyprus or Malta.

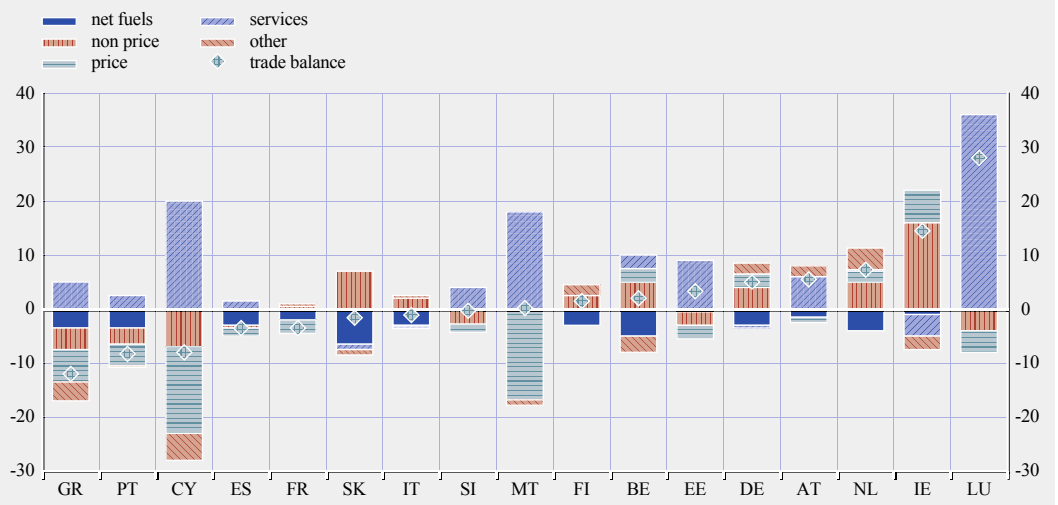
The indicator can be used as a tool for assessing which countries feature among those where structural policies aimed at boosting non-price competitiveness would be needed (more flexibility of product and labour markets, moving up the quality ladder by investing in R&D, integration of global value chains, etc.) or there is a case for an adjustment of relative prices.

(2) From an alternative perspective, non-price factors can be inherent to specialisation in high-growth sectors or to exporting towards the most dynamic destinations. In a joint project, the Banque de France and the World Bank (see Gaulier et al., 2013b) are working on decomposing export

8 Regarding the broad area of non-price competitiveness, the adjusted relative export prices computed by Benkovskis and Wörz (2012a and 2012b) can be employed for assessing non-price competitiveness for any specific product group.

Chart 6 Decomposition of the trade balance into price and non-price competitiveness (average 2008 – 2010)

(percentage of GDP)



Source: Osbat et al. (2012).

market shares along various dimensions: (i) the degree of product specialisation; (ii) the degree to which export destinations are fast-growing; and (iii) a pure competitiveness effect, free of compositional effects (or the so-called push effect). Their approach has several advantages over the standard constant market share (CMS) decomposition, the most notable one being the independence of the results from the ordering of the geographical and sectoral effects (the results from a more traditional CMS decomposition are presented in Appendix 2).

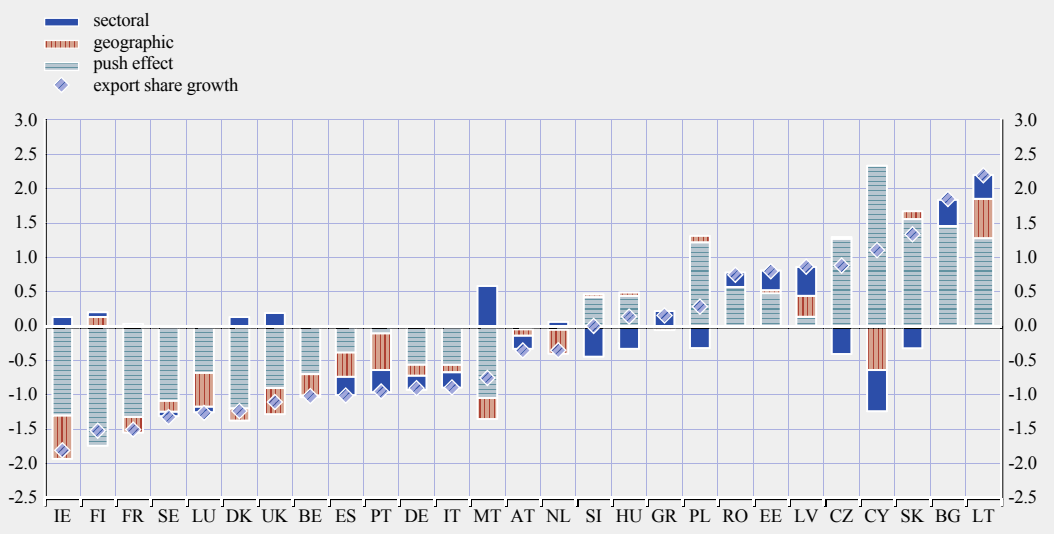
This tool provides a better understanding of export patterns, as well as insights into whether a reallocation of resources towards other sectors is necessary or a refocusing of trade relations on more dynamic markets is needed. The results obtained for EU countries are illustrated in Chart 7. *Most of the decline in export market shares is attributable to the squeeze on export performance free of other compositional effects.* However, the geographical orientation of exports towards shrinking markets also played a hindering role.

(3) Another powerful tool developed within CompNet by Benkovskis et al. (2012) is a "barometer" of the competitive pressures stemming from competitors on the same market. One of the possible explanations for the decreasing market shares of advanced European economies is the crowding-out from the proliferation of low-cost exporters from developing countries. An exemplification of this tool is the analysis of the magnitude and types of competitive pressure for individual euro area countries stemming from the BRIC (Brazil, Russia, India and China) countries and from other euro area countries (more details can be found in Appendix 3). Taking into consideration the dynamics of trade links with third countries between 2000 and 2010, the new indicator allows us to distinguish between the following situations:

- *No competition*: euro area country exports to a market not served by the competitor.
- *Existing competition*: euro area country and competitor are exporting to the same market.

Chart 7 Decomposition of export market share growth (Q2 2005 – Q3 2011)

(average growth; percentages)



Sources: World Bank/Banque de France; data from the Trade Map dataset of the International Trade Centre.

- *New competition*: euro area country or competitor enters a destination market where the other exporter is already active, or both enter a new market.

- *Crowding-out*: euro area country or competitor leaves a market where the other exporter is active or has entered.

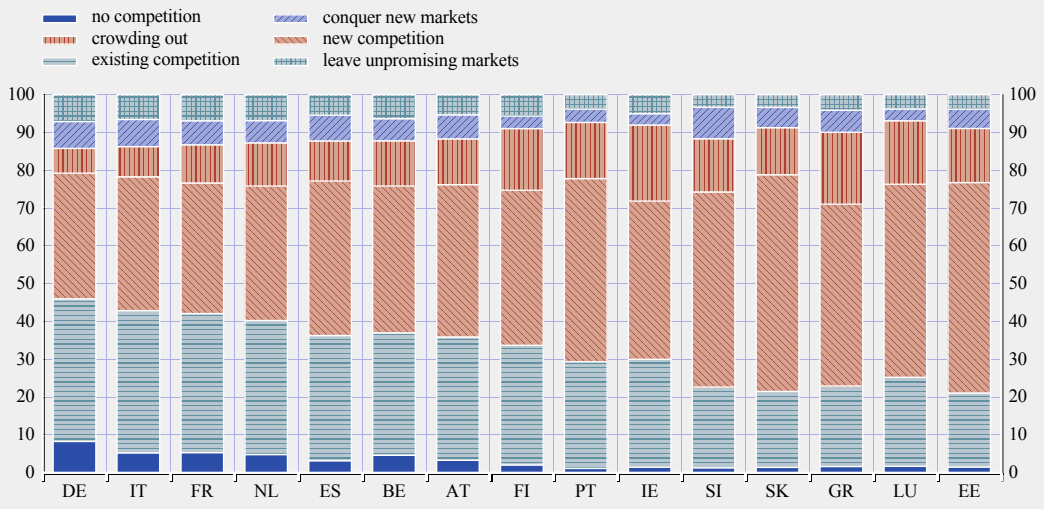
- *Conquering new markets*: euro area country starts exporting to a new destination market not served by competitor.

- *Leaving unpromising markets*: euro area country leaves market where competitor is not active, or both exporters leave simultaneously.

The results presented in Charts 8 and 9 reveal that even after controlling for country size, large euro area countries have continuously been more exposed to competition from both the BRICs as well as other euro area countries over the past decade than the smaller peripheral countries. Correspondingly, countries like Portugal, Ireland, Slovenia, Slovakia, Greece, Estonia and Luxembourg have increasingly faced new competition from the BRICs as well as from other euro area countries over this period. Finland is in a special position: while it has been exposed to relatively strong competition from other euro area countries since 2000, it resembles more a small peripheral country in competition with the BRICs. It should be noted that by 2010 all euro area countries were roughly equally exposed to competition from both other euro area countries and the BRICs regardless of their starting points. Thus, they stand in direct competition with a competitor from the euro area or the BRICs in about 70% of all possible product markets. In general, existing competition at the outset was higher within the euro area than between individual euro area countries and the BRICs.

Chart 8 "Barometer" of the competitive pressures: types of competition, euro area countries vs. BRICs

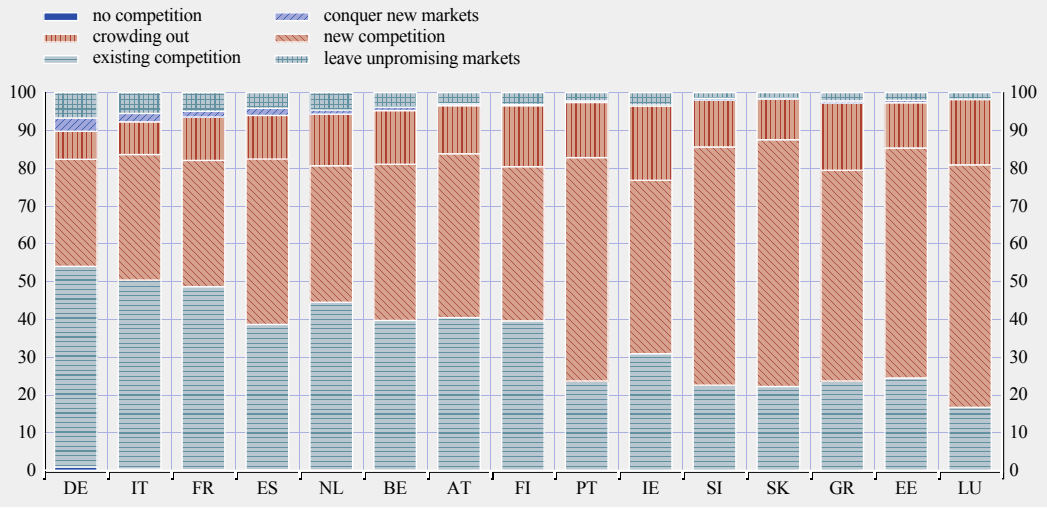
(in percentage of reporter's existing trade links)



Source: UN Comtrade, Latvijas Banka/Oesterreichische Nationalbank calculations.

Chart 9 "Barometer" of the competitive pressures: types of competition, intra-euro area

(in percentage of reporter's existing trade links)



Source: UN Comtrade, Latvijas Banka/Oesterreichische Nationalbank calculations.

(4) The ability to stand up to international competition also depends on the flexibility of the economy with respect to moving into new, yet promising markets and maintaining a presence there. For a calculation of the intensive (i.e. deepening of existing trade links) and extensive (i.e. opening up towards new regional or sectoral export markets) margin of trade, Benkovskis et al. (2012) split export growth (in nominal US dollars) into the growth in existing varieties (intensive margin) and the ratio of new to old varieties (extensive margin) in a year-to-year comparison.[9]

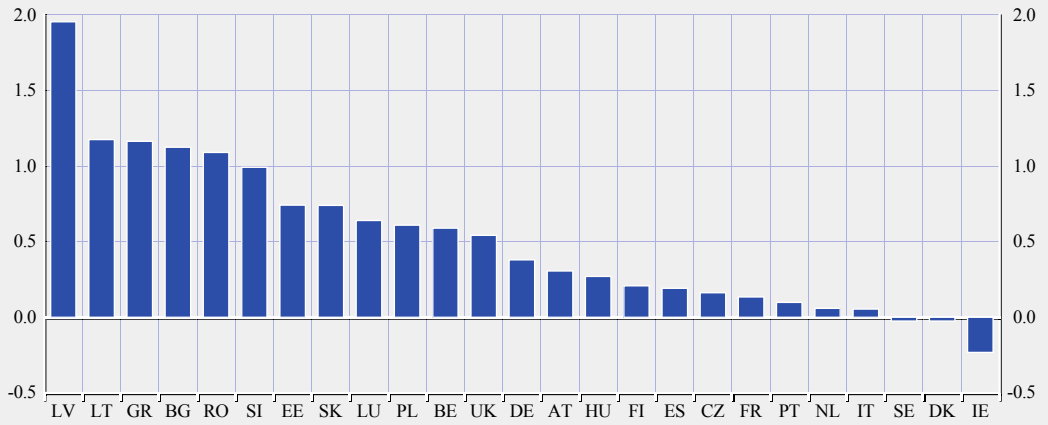
Chart 10 shows that the average contribution of the extensive margin to total trade growth was rather small over the last decade. Thus, *export growth of EU countries was mainly the result of a deepening of existing trade relationships rather than the exploration of new sectoral or geographical markets.* However, the establishment of new trade relationships is somewhat more important for export growth for the central, eastern and south-eastern European (CESEE) countries than for the core EU countries and the periphery. The analysis of annual data further suggests that the introduction of the single currency supported the establishment of new trade relationships for the core and periphery EU countries. The CESEE countries also seem to have benefited from spillover effects with a short time lag. Furthermore, EU accession in 2004 and 2007 boosted the establishment of new trade relationships for the CESEE countries. During the economic and financial crisis, exports declined remarkably for all countries. However, the decline was mainly caused by a reduction in the value of exports within established trade relationships rather than the termination of active trade links.

Using a similar approach, Gordo and Tello (2011) estimate the importance of the extensive, intensive and quality margins in trade performance for Germany, France, Italy and Spain. The results highlight the importance of the extensive margin in explaining the relatively good performance of

9 Thus, as in Amiti and Freund (2010), the authors implicitly use the variety index of Feenstra (1994) as the basis of the definition of the extensive margin whereby variety refers to each product-destination combination. A new variety is only counted in the extensive margin in the year when it is first exported. In subsequent years, it will be counted in the intensive margin. New varieties which do not survive a second year are excluded from the analysis.

Chart 10 Average contribution of the extensive margin to total export growth (2000 – 2010)

(percentages)



Sources: UN Comtrade, Latvijas Banka/Oesterreichische Nationalbank calculations.

Spanish goods exports between 2000 to 2009 compared to other Euro Area countries. However, the intensive margin remained relatively stable at low levels in Spain, while in France and Italy decreased, and the quality margin indicates that Spanish products have low quality, mainly compared to the German ones.

Going forward, the Network's main goal within workstream 1 *is to create a comprehensive diagnostic toolkit, internally consistent,* which could be used by member institutions in a variety of contexts (e.g. country missions, policy notes).

The diagnostic toolkit would also be complemented by a "therapeutic repertoire", i.e. a framework that establishes links between specific symptoms of imbalances and policy levers that could resolve them.

3 COMPETITIVENESS DIAGNOSTICS BASED ON FIRM-LEVEL DATA

3.1 CONCEPTUAL UNDERPINNINGS

Micro data offer crucial information for understanding the drivers of competitiveness, as aggregate performance depends strongly on firm-level factors (such as size, ownership and technological capacity). In particular, the micro dimension provides the necessary tool to analyse determinants of productivity, its distribution within and across sectors, the role of resource misallocation and the relationship with exports. This section provides conceptual details of the role of the micro dimension in the assessment of competitiveness and highlights some relevant results obtained so far within CompNet.

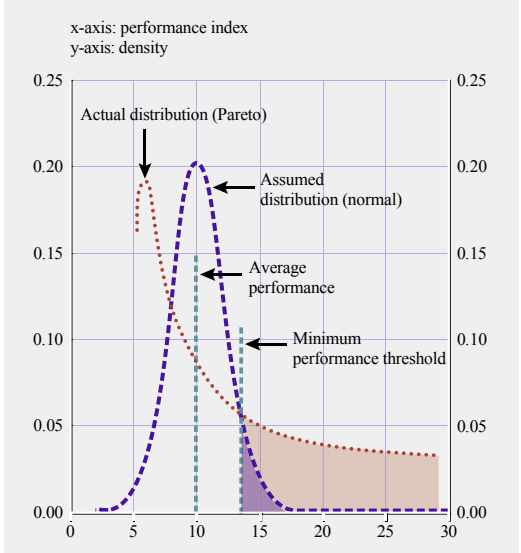
There are at least a statistical and an economic reason supporting the need to use firm-level data to complement the macro aggregated analysis of competitiveness. First, there is the statistical argument of a possible aggregation bias. Officially computed aggregated indicators are based on firm-level information, but are not entirely relevant from a firm-level perspective because of unknown firm-specific weights. *Due to high heterogeneity across firms, there is not really such a thing as a "representative" or an "average" firm,* and indicators that point to the average should be complemented with ones that account for the dispersion among firms. Second, from an economic standpoint, the large heterogeneity among firms markedly complicates the design of macroeconomic policies, as they should not be aimed at the "average" firm, but rather exploit the underlying skewedness and tackle differently each region of the distribution.

Chart 11 summarizes the rather wide empirical evidence that the actual distribution of firms' performance is extremely skewed, characterised by a large number of firms displaying very low performance and just a few highly performing. This also underlines that typically, firms have to surpass a certain productivity threshold in order to become exporters and there are just a few of them able to do so.

A relevant example of the way in which firm heterogeneity can induce an aggregation bias is that of the seemingly paradoxical relationship between the performance of Spanish exports and the loss in price competitiveness as measured by ULC-based indicators. Antràs et al. (2010) provide evidence that the satisfactory performance of Spanish exports over the period 2000-09 was explained by a *better behaviour of ULCs of large firms, which also managed to increase their exports more.* The different weights of large performing versus small under-performing firms in aggregate ULCs and in total exports may thus help to explain the "Spanish paradox".

As far as the policy implications of firm heterogeneity are concerned, there is much room for advances on the topic. The literature has progressed more on documenting firm heterogeneity in terms of outcomes and

Chart 11 Distribution of firms' productivity



Source: Altomonte et al. (2012).

characteristics, yet the full policy implications of this large heterogeneity have not been completely dealt with. *A reallocation of resources towards more productive firms can generate a boost in overall productivity, but it can also trigger negative spillovers for smaller and less productive firms.* One implication is that in order to both achieve aggregate performance and minimise social cost, two sets of different policies may be needed, dealing with different regions of the firm performance distribution. While average performance matters, its distribution within and across industries may matter even more.

A formal framework to assess the relationship between productivity and size has been put forward by Olley and Pakes (1996, henceforth referred to as "OP"), who showed that an index of productivity defined at the industry level and computed as a weighted average of firm-level productivity can be decomposed into an unweighted industry average of the firm-level productivity and a covariance term between size and productivity, as follows:

$$p_t = \sum_i s_{it} p_{it} = \bar{p}_t + \underbrace{\sum_i (s_{it} - \bar{s}_t)(p_{it} - \bar{p}_t)}_{\text{OP gap}} \qquad (1)$$

where p_t is an industry index at time t, p_{it} is the firm-level productivity, s_{it} is the share of activity of firm i, s_t and p_t are the unweighted industry averages of the firm measures. The last term in formula (1) is the OP gap. This latter term is a cross-country comparable measure of the extent to which firms with higher than average productivity have a higher than average share of activity, as a result of market selection mechanisms.

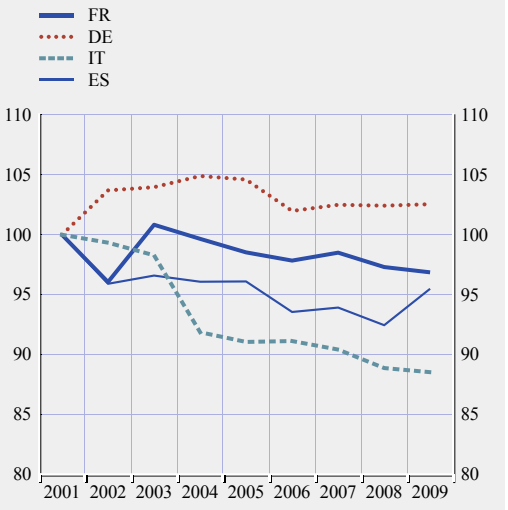
The powerful policy implication of the OP decomposition is that apart from enhancing productivity growth of incumbent firms, reallocation of resources within and across industries has a critical role in boosting overall productivity. Bartelsman (2013), for instance, finds that in a sample of 14 EU countries over the period 2001-2009, reallocation could lead to a substantial increase in labour productivity [10] over the long term.

Using EFIGE firm-level data matched with Amadeus data, Chart 12 indicates that in Germany there was an increase in the OP gap during the first part of the analyzed period, which may be related to resource reallocation triggered by the labour market reform.

The research conducted so far within CompNet has put forward three stylised facts based on firm-level information, as detailed further. 1) Export activities are concentrated among a limited number of firms that are larger and exhibit a higher productivity. 2) There is an

Chart 12 Labour productivity OP gap dynamics

(2001 = 100, percentages)



Source: CompNet calculations based on the EFIGE database (representative samples of manufacturing sector) matched with Amadeus and Hoppenstedt for Germany.
Note: labour productivity is added value per employee; firm-level weights based on share of employees (lower bound of 10 employees); outliers (1st and 99th) in the distribution have been dropped.

10 A 2.5% increase in labour productivity in the EU for the next 20-30 years appears attainable, depending on the policy environment.

intense process of entry and exit shaping the microeconomic structure of exports (see Galán and Martín, 2012 or Berthou and Vicard, 2013). Usually, new exporters tend to be small and have a low rate of survival, but those firms that do manage to survive the first few years of export activity tend to grow rapidly and their contribution to aggregate export growth is very large. These results suggest that while large exporters account for the bulk of aggregate exports of a country, the entry and exit of new exporters is important for the growth of aggregate exports in the medium run. *3) The size of the productivity premium of exporters relative to non-exporters appears to depend on the type of destination market that firms reach,* for example EU versus non-EU markets[11]. This result implies that while barriers to entry into remote or difficult markets may prevent low-productivity firms from entering and serving these markets, the decision to start exporting to closer and more accessible markets (EU/euro area markets) leaves more room for factors other than productivity.

3.2 THE COMPNET SET-UP FOR ANALYSING THE COMPETITIVENESS OF EU FIRMS

One of the main policy questions that CompNet is addressing is how can aggregate productivity be enhanced. In order to make progress on this field, CompNet has created an active network of country teams which are running independently a common algorithm to compute indicators related to sectoral labour and total factor productivity dynamics; this approach was chosen in order to deal with the problem of firm-level data confidentiality. The CompNet firm-level indicator database is superior to others available in several respects: (i) coverage (60 sectors and 13 EU countries); (ii) time horizon, since it includes the recent boom-bust cycle (see Table 1) and (iii) cross country comparability.

11 An ongoing joint project between Nationale Bank van België/Banque Nationale de Belgique, the Hungarian Academy of Sciences and the Banque de France.

Table 1 The country/time coverage of the CompNet database

Country	Total number of firms, annual average		Time range	
	Full sample	Of which over 20 employees	Full sample	Of which over 20 employees
BE	66,884	7,755	1996-2011	1996-2011
CZ	24,230	12,076	2005-2010	2005-2010
DE	25,167	19,634	1997-2010	1997-2010
EE	11,588	1,855	1995-2010	1995-2010
ES	245,121	22,769	1995-2011	1995-2011
FR	342,738	55,042	1995-2009	1995-2007
HU	n.a.	n.a.	n.a.	n.a.
IT	n.a.	3,007	n.a.	2002-2011
PL	n.a.	18,014	n.a.	2002-2011
PT	115,723	n.a.	2006-2009	n.a.
SI	16,700	2,143	1995-2011	1995-2011
SK	4,386	4,105	2000-2011	2000-2011
RO	115,846	16,990	2003-2011	2003-2011
EFIGE	n.a.	14,759	n.a.	2001-2008

Table 2 Indicators included in the CompNet database

Indicators	Descriptive Statistics
Number of employees	Number of observations
Real value added	Mean
Capital/labour ratio	Standard deviation
Labour productivity	Percentiles: 1, 10, 25, 50, 75, 90, 99
Capital productivity	Maximum
Wage share	Minimum
Unit labour cost (ULC)	Interquartile range
Total factor productivity (TFP)	Skewness
Covariances between size and TFP, ULC,wage share and labour productivity	K-parameter of TFP distribution
Olley-Pakes decomposition of labour productivity, capital productivity and TFP	
Number of employees	Number of observations

So far, the CompNet cross-country firm-level dataset comprises statistics on productivity measures (TFP and labour productivity), on cost of production factors and on the relationship between productivity and size (see Table 2).

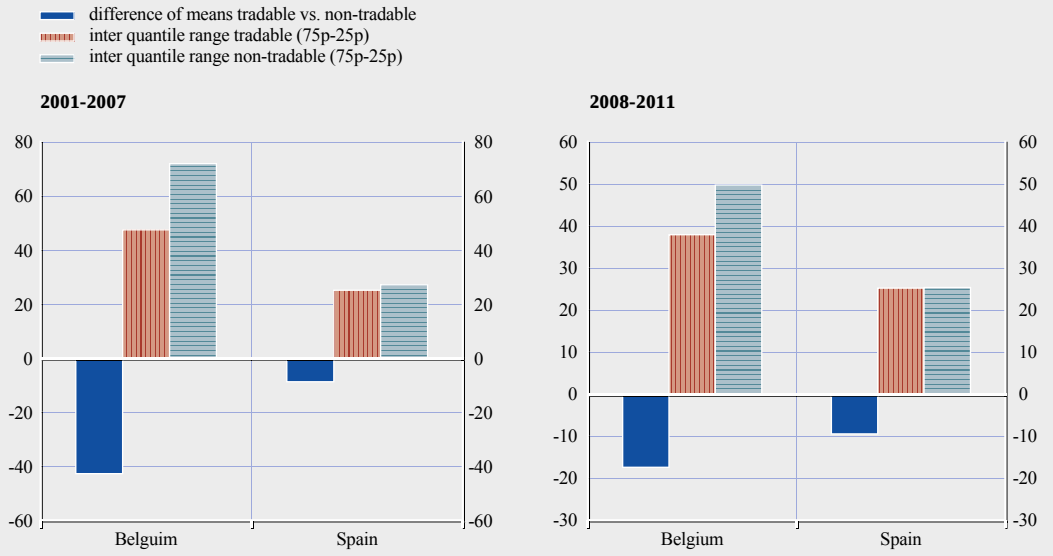
Two main stylised facts have been highlighted by the above indicators, confirming the previous findings in the literature.

1) *There is a high heterogeneity of firms' productivity across sectors, but even more so within sectors.* Chart 13 shows for both before and after the crisis that the heterogeneity of firm-level productivity[12] is relatively similar in the tradable and non-tradable sectors. The pattern bars illustrate the within-sector dispersion in productivity (difference between the 25th and the 75th percentile of the labour productivity distribution), which is in general larger than the cross-sector variation in productivity, illustrated by the solid blue bar (the difference between the productivity averages in tradable and non-tradable sectors). While the dispersion is large within sectors, the differences are much smaller between the tradable and non-tradable sector. This suggests that structural policies aimed at switching resources from non-tradable to tradable sectors should also be complemented with others aimed at increasing the reallocation within the tradable sector. Moreover, the former type of policies can be costly and inefficient if resources are not allocated towards firms above the productivity cut-off. Recent studies point to a substantial boost in aggregate productivity that stems not from diverting resources among sectors, but rather within sectors (see Hsieh and Klenow, 2009).

2) *There is a positive relationship between labour productivity of firms and their number of employees.* For instance, across two different time periods, before and after the crisis (see Chart 14), Spanish medium-large sectors tend to have higher than average labour productivity. This is in line with the explanation of Antràs et al. (2010) regarding the "Spanish paradox", as well as with the finding of Fernández and López-García (2013), which find that large firms' TFP distribution in a number of countries, particularly in the case of Spain, dominates that of small firms.

12 It is worth mentioning that productivity can only be measured by the firm's revenue productivity. Haltiwanger (2012) makes the distinction between "physical productivity" or TFPQ and "revenue productivity" or TFPR. As the plant-specific deflators are usually not available, industry deflators are used in practice to compute TFPR, which is merely a proxy of TFPQ. However, as long as the plant-level deflators are normally distributed across plants, this is a satisfactory approximation.

Chart 13 Labour productivity distribution



Source: CompNet database.
Note: tradable sectors: all manufacturing sectors excluding coke (NACE 19), non-tradable sectors: rest of sectors excluding energy (NACE 5-9, 35-39). Averages and inter quantile ranges weighted by share of output.

Chart 14 Productivity and size

Source: CompNet database.

4 THE RELEVANCE OF GLOBAL VALUE CHAINS IN ASSESSING COMPETITIVENESS

The third dimension taken into account within CompNet's assessment of competitiveness is the recent internationalisation of production. The increase in intermediate goods trade and the upswing in the trade in "tasks"[13] are just some of the aspects of the emergence of global value chains, which have resulted in a reconfiguration of world trade in terms of participants and comparative advantages. These changes are directly linked with international competitiveness and labour market developments.

Given the structural changes in production models that are taking place worldwide, CompNet is aiming to put forward a comprehensive set of indicators relevant for assessing the degree of integration of EU countries into GVCs and the implications for overall performance. The selected indicators presented in this section point to the fact that European countries have generally become more integrated into GVCs, and these linkages are strong inside the euro area. One important implication is that traditional price/cost factors are less critical as export determinants. For example, the effect of an exchange rate change is mitigated by the high import content of exports, as the impact on export prices is partly offset by the change in import prices. A similar example relates to the calculation of market shares. One country can gain export market share in one specific product/market, but if the import content of such exports is increasing substantially, this makes a limited contribution to national GDP.

By analysing GVCs and their implications more deeply, the research within CompNet aims to provide answers to the following questions: (i) what is the evidence on the importance of GVCs in the euro area, (ii) what is the role of European firms in the global economy, (iii) what is the role of business groups in GVCs and (iv) what is the relevance of GVCs in the resilience to shocks and external imbalances? The aim is to use the answers to these questions in order to modify accordingly the overall assessment of competitiveness.

4.1 EUROPE AND GLOBAL VALUE CHAINS

The identification and measurement of the international fragmentation of production processes is a key issue for policy assessment, especially for highly integrated economies such as the ones that form the monetary union. However, although intense research is trying to encompass the mutations in international trade, there is much work to be done to be able to measure both the integration into GVCs and the related impact on a country's competitiveness. Recent literature also makes reference to global production "networks'' rather than ''chains'' to emphasise the complexity of the linkages among global producers (see, for example, Lejour et al., 2012).

The main statistical tool used in analysing GVCs consists in global input-output tables. Nevertheless, several authors have called for additional micro-level evidence, as strong assumptions are required for the construction of global input-output tables. *As the research on constructing appropriate databases is fairly advanced in a number of institutions (e.g. the World Trade Organization, the Organisation for Economic Co-operation and Development and the United States International Trade Commission), CompNet has functioned as a hub across databases and methodologies,* trying to facilitate the comparisons among them and eventually ensure complementarity of the

13 According to Lanz et al. (2011), "a task is an activity that needs to be accomplished within a defined period of time. Production of goods and services consists of a number of individual tasks". Trade in tasks refers to that part of activities of firms that has been increasingly outsourced, i.e. supplied by an independent firm.

ensuing research[14]. The main databases that CompNet members can currently make use of are provided by the OECD and the WTO (the TIVA project) and by the consortium funded by the European Union that has set up the World Input-Output Database (WIOD).

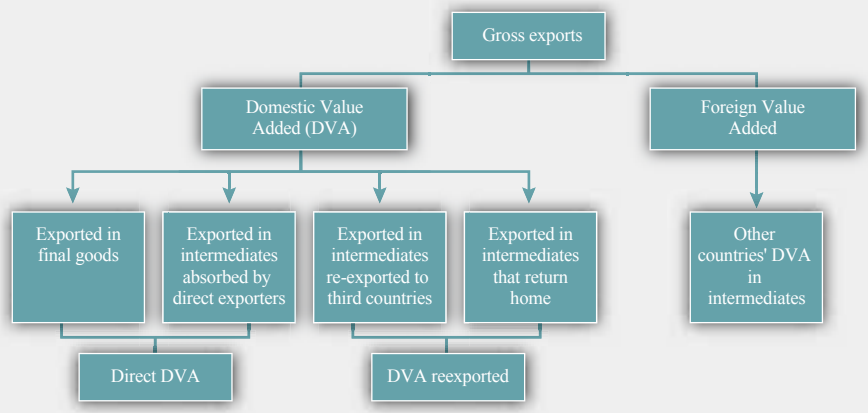
So far, the research conducted within CompNet has resulted in a set of indicators useful for assessing the position and integration of European countries in global markets, among which the following will be detailed: (1) the decomposition of the value added embodied in national exports; (2) the degree of integration into GVCs; and (3) the position in GVCs.

(1) *Disentangling the value added in trade flows is at the core of current GVC research.* In fact, in a context marked by a high import content of exports, traditional trade statistics that record *gross flows* of goods and services each time they cross borders have become much less informative about the actual value added generated in a particular country (see Chart 15 for an illustration of the decomposition of value added embedded in exports). For instance, in gross terms, the main export partner of Germany is France, and for Italy and France it is Germany. However, in value added terms (according to OECD data), for all three major European countries, the main export partner is the United States, a finding which also sheds new light on the pattern of international shock transmission.

Based on the WIOD, Amador et al. (2013) provide evidence of domestic and foreign value added embodied in the exports of euro area countries.

In 2011 *the foreign value added content of exports was* about 3*2% for the average euro area country* (see Chart 16), with smaller countries generally exhibiting higher values. The dynamics of this indicator suggests that there could be a pro-cyclical pattern in the use of foreign inputs in production of exports, but overall *there has been a stronger engagement in international production linkages for the majority of the euro area countries.* Moreover, it is visible that the

Chart 15 Decomposition of value added embedded in exports



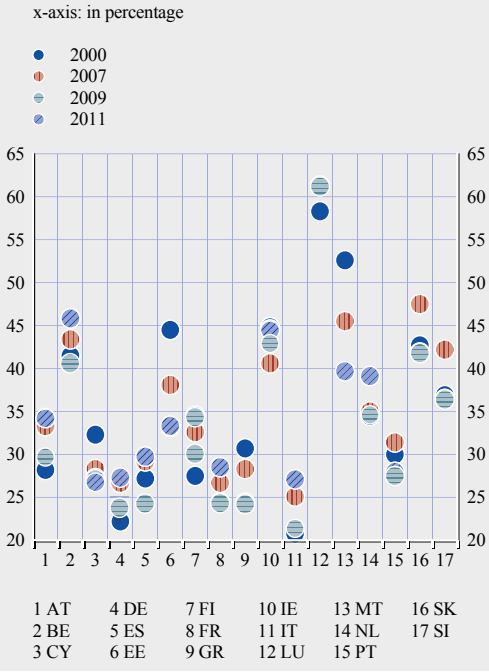
Source: Based on Koopman et al. (2010).

14 In support of this, CompNet has organized a conference entitled "National Competitiveness, Scalability of International Value Chains and Location of Production" jointly with the World Bank and the Peterson Institute for International Economics on 16-17 April, 2013 in Washington DC: http://www.ecb.int/home/pdf/research/compnet/20130416_Draft_Agenda_First_Day.pdf?d374b20142279ab8e5866a43b1c369d2

phenomenon regained momentum in 2011 after the trade collapse that took place in 2009. An additional result of the study is that the imported value added share in exports of goods is higher than in exports of services, which renders the latter more important in value added terms.

The increased use of imported intermediates may allow countries to become successful exporters. Taking a broader perspective, Timmer et al. (2013) introduce the concept of GVC income, denoting the total domestic value added associated with the production of final manufacturing goods for both the international and domestic market, as the latter is also open to foreign competitors. The main finding is that Europe still holds the edge with respect to GVC income in final manufactures, mainly due to an increased comparative advantage in supporting service activities, despite the recent process of internationalisation, the rise of China etc.

Chart 16 Foreign value added in euro area exports (2000 – 2011)



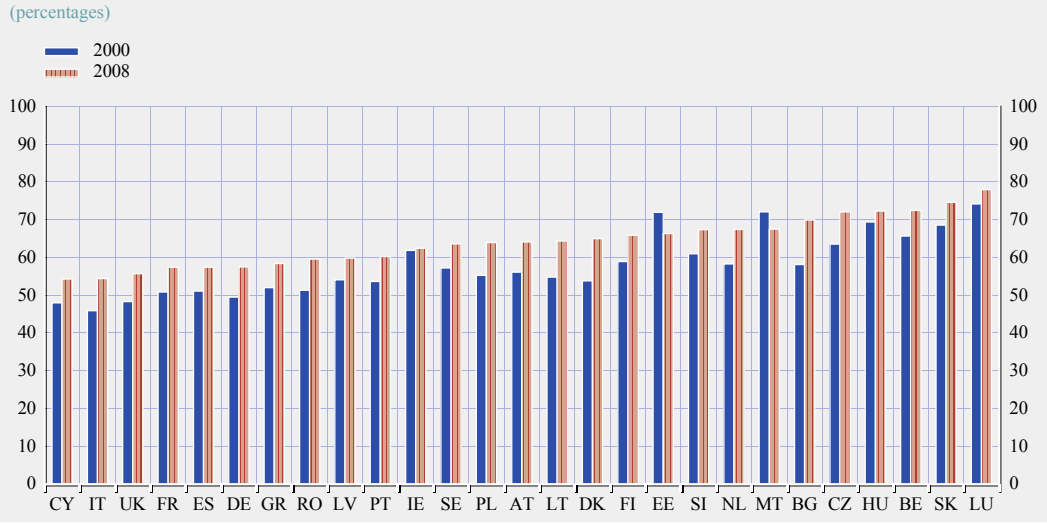
Source: Amador et al. (2013) based on WIOD data.

(2) *An important aspect of the analysis of GVCs is the extent to which countries are involved in vertically fragmented production.* Traditionally, the import content of exports was used in this respect, assessing the importance of foreign suppliers backwards in the value chain.[15] However, this indicator does not take into account that a country participating in GVCs is also a supplier of inputs used in third countries for further exports. A combination of the two is proposed by Koopman et al. (2010). Chart 17 depicts the degree of participation in GVCs, as shown in Koopman et al. (2010). This index measures the extent to which a country is involved in vertically fragmented production and takes into account the following two dimensions: (i) the use of foreign inputs for its own exports (*ForeignVA*); and (ii) the supply of intermediate goods or services used in other countries' exports (*Domestic* $VA_{reexported}$). The higher the import content of exports and the higher the value of exported inputs that are re-exported to third countries, the higher the participation of a given country in the value chain. European countries appear to be highly integrated into GVCs and this interconnectedness has deepened with time. However, the participation index does not provide information about the position of countries within GVCs, e.g. whether they are closer to or farther away from final demand.

(3) *The position of a country within value chains is determined by the extent to which most of its activity is upstream* (producing goods and services at the beginning of the value chain) *or downstream* (adding inputs towards the end of the production process) depending on its specialisation. Upstream countries specialise in the production of raw materials or intangibles necessary at the beginning of the value chain (e.g. research and design), whereas downstream countries specialise in the assembly of final products or customer services. De Backer and Miroudot (2013) compute the "upstreamness"

15 It is worth mentioning that computing even relatively straightforward indicators such as the import content of production is not a trivial task; Breda and Cappariello (2012) show that this indicator is more relevant if both the direct and indirect import content of production are taken into account, with the latter being already included in domestic inputs.

Chart 17 Degree of participation [1] in GVCs (2000 vs. 2008)



Sources: WIOD and ECB calculations.

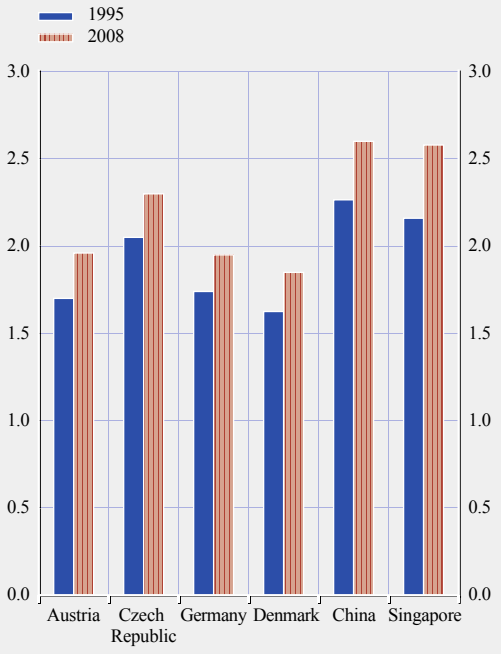
1) $Degree\ of\ participation\ in\ GVCs = \frac{DomesticVA_{reexported}}{Exports} + \frac{Foreign\ VA}{Exports}$

index referred to as the "distance to final demand" in terms of production stages proposed by Fally (2011) and Antràs et al. (2012), which basically measures how many plants a product will go through (e.g. by being assembled with other products) before reaching final demand.

Most of the European countries moved upstream along the production chain, the most significant changes being presented in Chart 18 and compared with China and Singapore.

Evidence suggests that only a few countries in Europe moved downstream in the analysed period (namely Poland, Portugal, Romania, Slovakia and Slovenia). The fact that the general tendency of EU countries is to move upstream along the value chain is consistent with the overall increase in the length of GVCs and the outsourcing phenomenon, as outsourcing inherently increases the distance to final demand. However, more research is necessary in order to assess the potential benefits associated with the relative position in the production chain.

Chart 18 Distance to final demand, by economy



Sources: De Backer and Miroudot (2013) based on the OECD ICIO model (December 2012 release).

4.2 PRELIMINARY ASSESSMENT OF THE IMPACT OF INTEGRATION INTO GVCS

The ability of a country to be highly integrated in global trade and benefit from positive spillovers is positively correlated with its ability to join GVCs. The objective is not necessarily to develop an integrated production line, but to find the right position within the international value chain, as pointed out by Cattaneo et al. (2013). The authors review a WTO survey conducted among leading firms within GVCs with respect to factors hindering sourcing and investment decisions and find that the most important factors include corruption, high transport and logistics costs, the business and regulatory environment, customs delays, small market size with low purchasing power and low labour skills. This supports the idea that *the policy element is a key factor that determines the degree of integration into GVCs, as well as the overall performance when operating within supply chains;* this is not limited to the degree of trade liberalisation, but includes a plethora of policies that affect operating costs, such as the simplicity of the tax system, the rule of law and labour market flexibility. Antràs et al. (2012) suggest that stronger enforcement of the rule of law together with high physical and human capital endowment tend to be positively correlated with the ability of a country to specialise in exporting in relatively upstream industries.

The organisational set-up of GVCs matters also for their productivity. Altomonte and Rungi (2013), using firm-level data on business groups, found that there is a robust, non-linear relationship between organisational complexity and productivity. The relationship between vertical integration and productivity is, on the other hand, not so straightforward.

Integration into GVCs can have a snowball effect on the rest of the economy, by engaging other domestic activities in the production chain. Cappariello (2012) shows for several large euro area countries that domestic value added of exports can be decomposed into a direct and an indirect value added, the latter being generated in the upstream sectors including services, which support main export activities. This is a relevant attempt, as emphasised by OECD and WTO (2011): "*This break-down is particularly important when identifying the sources of national competitiveness, which may rest in up-stream sectors which are not considered as exporters by traditional statistics, or measuring the employment impact of export production.*"

The impact on employment stemming from participation in GVCs is an intensely debated topic. Timmer et al. (2013) show that in most EU countries, *offshoring has prompted a boost in employment in services, which offsets the lost jobs in pure manufacturing activities.* Thus, the importance of services embodied in production/exports has increased not only in terms of value added, but also in terms of job creation.

5 CONCLUSIONS AND WAY FORWARD

The research conducted so far within CompNet has added value to the existing framework of competitiveness assessment on all three levels of analysis: macro, micro and cross-border.

On the aggregate, macro side, CompNet research has highlighted the role of additional "non-price" factors in explaining trade results and has put forward a set of theoretically and methodologically refined competitiveness indicators able to capture the "non-price" drivers.

On the micro level, the research conducted within the Network has confirmed the crucial role of firm-level factors (such as size, ownership and technological capacity) in understanding the drivers of aggregate performance and has developed a centralised project to compute cross-country homogenous indicators of labour and total factor productivity, as well to analyse the role of resource reallocation in boosting aggregate productivity.

On the cross-border level, the Network has stressed the importance of understanding the implications of integration into global value chains for the overall assessment of competitiveness. To this purpose, CompNet has functioned as a hub across databases and methodologies and put forward a set of indicators relevant for assessing the position and integration of European countries in global markets.

Going forward, the ultimate objective of the Network remains unaltered, i.e.: (i) strengthen the interaction between macro, micro and GVC analysis; and (ii) deepen the understanding of competitiveness drivers in order to more solidly inform policy formulation.

More specifically, we plan five major interrelated strands of action: (1) refine the new macro indicators; (2) fully exploit the newly developed firm-level-based indicators; (3) improve the conceptual and empirical framework linking external imbalances and competitiveness; (4) clarify the implication of participation and position in GVCs for competitiveness assessment and (5) extract policy advice.

(1) *On the macro side we will aim at providing to policy areas, including country teams, additional indicators which can be added to the present diagnostic toolkit.* Particular emphasis will be placed on illustrating advantages of the newly developed indicators within the context of a broader assessment of competitiveness.

(2) *On the firm level analysis, the objective is to fully exploit the indicators newly developed by CompNet country teams. This entails at least three dimensions:*

a) *Finalise the evidence on productivity dynamics and drivers within sectors and across sectors for all the countries represented in the dataset.* Of particular interest will be the results regarding the relationship between size and productivity and the role played by reallocation. Also related to resource allocation, an important question will be to establish by what degree the recession had cleansing effects on the economy – or the extent to which the most productive firms were hit the least.

b) *Examine the impact of productivity distribution on export performance.* To this end additional indicators readily available or easy to collect may be included in the analysis, such as R&D, FDI, measures of credit constraints. In this context, members of the Network are involved in specific studies – based on firm level information – on credit constraints faced by

small and medium-sized enterprises, as this has been regarded as a growth bottleneck in the aftermath of the crisis.

c) *Consider what additional indicators are needed to complement balance sheet data, in order to establish a more solid connection between competitiveness and its determinants.*

(3) *On the interaction between external imbalances and competitiveness, CompNet research aims to integrate the firm-level dimension with traditional macro assessment and modelling.* Firm-level data can offer new insights for the study of external imbalances. They provide a clearer understanding of the adjustment process (if it is done through intensive or extensive margins) and also of the extent of the needed adjustment in relative prices. Building on the work of Pappada (2011), an ongoing CompNet project shows that when firm heterogeneity is large (as assumed to be the case in reality), the more productive incumbent firms account for a bigger chunk of total exports, and new exporting firms contribute to a smaller extent to the adjustment of imbalances, which puts more pressure on the exchange rate. The model is to be calibrated using empirical findings related to the size and productivity distribution of firms across the euro area using the CompNet firm-level database.

(4) *As for GVCs, envisaged projects aim at providing a better understanding of the role of services for trade, refining the available measures of integration and position (upstreamness vs. downstreamness) into GVCs and the analysis of EA shocks and imbalances.*

(5) *On the policy front, it is the objective of CompNet to be able to design a set of competitiveness-enhancing policies which are fully grounded in empirical and conceptual findings. This would also provide valuable inputs to the EU country surveillance exercise, country mission teams as well as to the overall policy debate.*

REFERENCES

Altomonte, C., Aquilante, T. and Ottaviano, G. I. (2012), "The triggers of competitiveness: The EFIGE cross-country report", *Bruegel Blueprint Series XVII*.

Altomonte, C., di Mauro, F. and Osbat, C. (2013), "Going Beyond Labour Costs: How and why 'structural' and micro-based factors can help in explaining export performance?", *CompNet Policy Brief No 1*.

Altomonte, C., di Mauro, F., Ottaviano, G. I. and Barba Navaretti, G. (2011a), "Assessing competitiveness: how firm-level data can help", *Bruegel Policy Contribution No 16*.

Altomonte, C., di Mauro, F., Ottaviano, G. I., Rungi, A. and Vicard, V. (2011b), "Global Value Chains During the Great Trade Collapse: A Bullwhip Effect?", *Paolo Baffi Centre Research Paper No 108*.

Altomonte, C. and Rungi, A. (2013), "Business Groups as Hierarchies of Firms: Determinants of Vertical Integration and Performance", forthcoming in the *ECB Working Paper Series*.

Amador, J., Cappariello, R. and Stehrer, R. (2013), "Global value chains: A view from the euro area", paper presented at the CompNet conference in Washington, 16-17 April 2013.

Amiti, M. and Freund, C. (2010), "The anatomy of China's export growth", in Feenstra, R. C. and Wei, S.-J. (eds.), *China's Growing Role in World Trade,* University of Chicago Press, pp. 35-56.

Antràs, P., Chor, D., Fally, T. and Hillberry, R. (2012), "Measuring the Upstreamness of Production and Trade Flows", forthcoming in *American Economic Review Papers and Proceedings*.

Antràs, P., Segura-Cayuela, R. and Rodriguez, D. (2010), "Firms in international trade (with an application to Spain)", *mimeo*.

Bartelsman, E. (2013), "ICT, Reallocation and Productivity", *mimeo*.

Bartelsman, E., Haltiwanger, J. and Scarpetta, S. (2013), "Cross-country differences in productivity: the role of allocation and selection", *American Economic Review,* 103(1), pp. 304-334.

Benkovskis, K. and Wörz, J. (2012), "Non-Price Competitiveness Gains of Central, Eastern and Southeastern European Countries in the EU Market", *Focus on European Economic Integration,* 3, pp. 27-47.

Benkovskis, K. and Wörz, J. (2012b), "Non-price competitiveness of exports from emerging countries", *Working Paper Series,* No 19, Bank of Finland Institute for Economies in Transition, submitted to the *ECB CompNet Working Paper Series*.

Benkovskis, K., Silgoner, M., Steiner, K. and Wörz, J. (2012), "Crowding out or Mutual Competition? Competitive Position of EU Members and China in the Global Market", submitted to the *ECB CompNet Working Paper Series*.

Berthou, A. and Vicard, V. (2013), "Firms' Export Dynamics: Experience vs. Size", forthcoming ECB CompNet Working Paper.

Bojesteanu Bobeica, E. and Manu, A. S. (2012), "Disentangling the factors behind the external adjustment in the New Member States during the crisis", paper presented at the CompNet conference in Frankfurt, 10-11 December 2012.

Breda, E. and Cappariello, R. (2012), "A tale of two bazaar economies: an input-output analysis of Germany and Italy", *Economia e Politica Industriale,* 39(2), pp. 111-137.

Cappariello, R. (2012), "Domestic value added content of exports: a cross-country comparison for the major European economies", *mimeo*.

Cattaneo, O., Gereffi, G., Miroudot, S. and Taglioni, D. (2013), "Joining, upgrading and being competitive in global value chains: a strategic framework", *World Bank Policy Research Working Paper,* No. WPS 6406.

Corbo, V. and Osbat, C. (2012), "Optimism bias? The elasticity puzzle in international economics revisited", *Working Paper Series,* No 1482, ECB.

Corbo, V. and Osbat, C. (2013), "Trade Adjustment in the European Union: A Structural Estimation Approach", *Working Paper Series,* No 15352, ECB.

De Backer, K. and Miroudot, S. (2013), "Mapping Global Value Chains", forthcoming ECB CompNet Working Paper.

Di Comite, F., Thisse, J. F. and Vandenbussche, H. (2012), "Verti-zontal differentiation in monopolistic competition", *Working Paper Series,* No 216, Nationale Bank van België/Banque Nationale de Belgique.

Di Mauro, F. and Forster, K. (2008), "Globalisation and the competitiveness of the euro area", *Occasional Paper Series,* No 97, ECB.

Di Mauro, F. and Task Force of the Monetary Policy Committee (2005), "Competitiveness and export performance of the euro area", *Occasional Paper Series,* No 30, ECB.

Di Mauro, F., Rüffer, R. and Bunda, I. (2008), "The changing role of the exchange rate in a globalised economy", *Occasional Paper Series,* No 94, ECB.

Dieppe, A. and Working Group on Econometric Modelling of the ESCB (2012), "Competitiveness and external imbalances within the euro area", *Occasional Paper Series,* No 139, ECB.

Draghi, M. (2012), "Competitiveness: the key to balanced growth in monetary union", speech delivered in Paris on 30 November 2012.

Esteves, P. S. and Rua, A. (2013), "Is there a role for domestic demand pressure on export performance?", forthcoming ECB Working Paper.

European Commission (2010), "Product Market Review 2010-11", *European Economy*, No 8.

Fally, T. (2011), "On the Fragmentation of Production in the US", mimeo.

Feenstra, R. (1994), "New product varieties and the measurement of international prices", *American Economic Review,* 84 (1), pp. 157-177.

Felipe, J. and Kumar, U. (2011), "Unit Labor Costs in the Eurozone: The Competitiveness Debate Again", *Working Paper Series,* No 651, Asian Development Bank.

Fernández, C., and Lopez-Garcia, P. (2013), "Why are Spanish small firms less productive?: An analysis using Spanish, French and Italian firm-level data". paper presented at the CompNet conference in Frankfurt, 10-11 December 2012.

Fernández, C., García, C., Rodríguez, A., and Tello, C. (2012), "Analysis of the import activity of European firms". *Economic Bulletin, Banco de España*, October 2012.

Formai, S. and Osbat, C. (2013), "The determinants of trade competitiveness: a Bayesian Model Selection approach", paper presented at the CompNet conference in Dublin, 12-13 March 2013.

Gabrisch, H. and Staehr, K. (2012), "The Euro Plus Pact: competitiveness and external capital flows in the EU countries", *Working Paper Series,* No 5/2012, Eesti Pank.

Galán, E., and Martín, C. (2012), "The stability of the commercial relations of Spanish exporters: A microeconomic analysis of its determinants". *Economic Bulletin, Banco de España, May 2012*.

Gaulier, G., Taglioni, D. and Vicard, V. (2013a), "Tradable sectors in the Eurozone periphery", submitted as a CompNet Policy Brief.

Gaulier, G., Taglioni, D. and Zignago, S. (2013b), "Export Performance in the Wake of the Global Crisis: Evidence from a New Database of Competitiveness Indicators", *mimeo*.

Gaullier, G. and Vicard, V. (2012), "Current Account Imbalances in the EuroArea: Competitiveness or Demand Shock?". *Bank of France Quarterly Selection of Articles,* No. 27.

Gordo, E., and Tello, P. (2011), "Diversificación, precios y calidad de las exportaciones españolas: una comparación a nivel europeo". *Cuadernos Económicos,* No. 82. ICE. Ministerio de Industria, Comercio y Turismo.

Haltiwanger, J. (2012), "Firm Dynamics and Aggregate Fluctuations: (Some) Open Questions", paper presented at the CompNet conference in Paris, 20-21 September 2012.

Hsieh, C.-T. and Klenow, P. J. (2009), "Misallocation and manufacturing TFP in China and India", *Quarterly Journal of Economics,* 124 (4), pp. 1403-1448.

Lane, P.R. and Milesi Feretti, G. M. (2011), "External adjustment and the global crisis", *Working Paper Series*, No 17352, National Bureau of Economic Research.

Osbat, C., Özyurt, S. and Karlsson, T. (2012), "Trade balance contributions of price and non-price factors: a cross-country analysis", presented at the CompNet conference in Frankfurt, 10-11 December 2012.

Koopman, R., Powers, W., Wang, Z. and Wei, S.-J. (2010), "Give credit where credit is due: tracing value added in global production chains", *Working Paper Series,* No 16426, National Bureau of Economic Research.

Krugman, P. (1996), "A Country is not a Company", *Harvard Business Review,* 74 (1), pp. 40-51.

Lanz, R., Miroudot, S. and Nordås, H. K. (2011), "Trade in Tasks", *Trade Policy Working Paper Series,* No 117, OECD.

Lejour, A., Rojas-Romagosa, H. and Veenendaal, P. (2012), "Identifying hubs and spokes in global supply chains using redirected trade in value added", *Discussion Paper Series,* No 227, CPB Netherlands Bureau for Economic Policy Analysis.

OECD and WTO (2011), *Trade in value-added: Concepts, methodologies and challenges*, Geneva.

Olley, S. and Pakes, A. (1996), "The Dynamics of Productivity in the Telecommunications Industry", *Econometrica,* 64 (6), pp. 1263-1298.

Orszaghova, L., Savelin, L. and Schudel, W. (2013), "External competitiveness of EU candidate countries", *Occasional Paper Series,* No 141, ECB.

Pappada, F. (2011), "Real Adjustment of Current Account Imbalances with Firm Heterogeneity", *IMF Economic Review,* 59 (3), pp. 431-454.

Stockholm School of Economics Riga, Baltic International Centre for Economic Policy Studies and Ernst & Young (2012), *Latvian Competitiveness Report 2011*, Riga.

Timmer, M., Los, B., Stehrer, R. and De Vries, G. (2013), "Fragmentation, Incomes and Jobs: An analysis of European competitiveness", paper presented at the CompNet conference in Washington, 16-17 April 2013.

Vandenbussche, H. (2012), "Evaluating Quality in Export Markets", paper presented at the CompNet conference in Frankfurt, 10-11 December 2012.

World Economic Forum (2012), *Global Competitiveness Report 2012-2013,* Geneva.

APPENDICES

I COMPNET RESULTS ON TRADE ELASTICITIES

Table A1 Aggregated elasticities of substitution of imports and exports

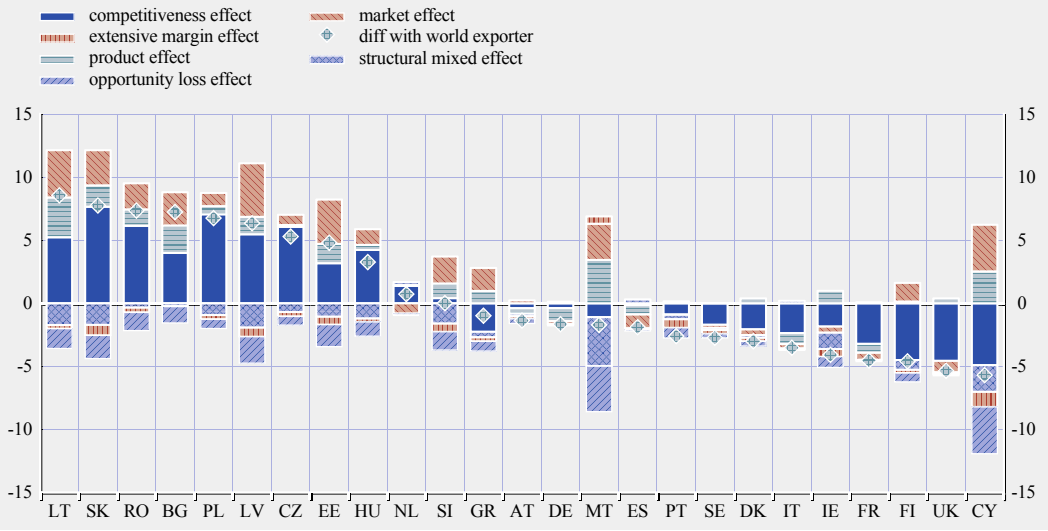
Country	IMPORTS Bootstrap (all sectors)			EXPORTS Bootstrap (all sectors)		
	Mean	Median	Mode	Mean	Median	Mode
Austria	24.5	5.7	4.5	5.3	4.0	3.8
Belux	7.2	3.5	3.1	3.4	3.1	3.0
Bulgaria	13.7	4.9	3.8	7.4	3.4	3.0
Cyprus	25.1	5.6	4.4	22.0	6.4	5.2
Czech Republic	13.3	3.8	3.4	9.5	4.3	3.8
Denmark	8.6	3.9	3.3	4.2	3.6	3.4
Estonia	29.3	6.5	4.8	19.2	7.9	6.5
Finland	10.9	4.0	3.5	4.6	3.5	3.4
France	13.2	4.3	3.7	8.9	4.4	3.8
Germany	8.2	4.2	3.7	13.3	5.3	4.3
Greece	28.5	3.1	2.9	22.0	4.6	4.1
Hungary	9.6	3.8	3.3	7.7	4.5	4.2
Ireland	5.0	2.9	2.7	3.4	3.3	3.2
Italy	4.6	3.4	3.2	4.7	3.4	3.2
Latvia	8.1	3.1	2.8	19.3	6.0	5.1
Lithuania	8.0	3.1	2.7	14.0	6.0	4.9
Malta	8.7	2.9	2.6	34.4	5.0	4.4
Netherlands	9.5	4.1	3.5	5.3	3.7	3.5
Poland	13.4	4.5	3.7	9.0	5.3	4.7
Portugal	6.8	3.6	3.3	5.4	4.1	3.9
Romania	6.0	3.1	2.8	6.4	3.4	3.2
Slovakia	8.5	4.1	3.7	7.8	4.3	3.9
Slovenia	13.1	4.8	4.0	10.8	4.4	3.9
Spain	5.5	3.8	3.4	6.7	3.5	3.2
Sweden	15.8	5.0	4.2	25.5	5.2	4.5
UK	4.4	3.1	2.9	6.0	3.3	3.0

Source: Corbo and Osbat (2012).

2 SHIFT-SHARE DECOMPOSITION OF EXPORT GROWTH

Chart A.2 Shift-share decomposition of export growth (average effects 1999 – 2011)

(percentages)



Source: M. Dyadkova and G. Momchilov (Bulgarian National Bank), calculations based on UN Comtrade.

The traditional constant market share (CMS) decomposition of export growth has a zero residual – the difference between the sum of all calculated effects, including the growth rate of world exports, and the total growth rate of exports of the country of interest – only if the focus country has trade lines for all possible product-partner combinations. Otherwise, the researcher has to decide how to deal with trade lines on the extensive margin of trade of the focus country. Another problem, especially on highly disaggregated data, is the product-partner combinations that exist in the world but the focus country does not have. When included in the calculation they lead to distortion and misinterpretation of the final results.

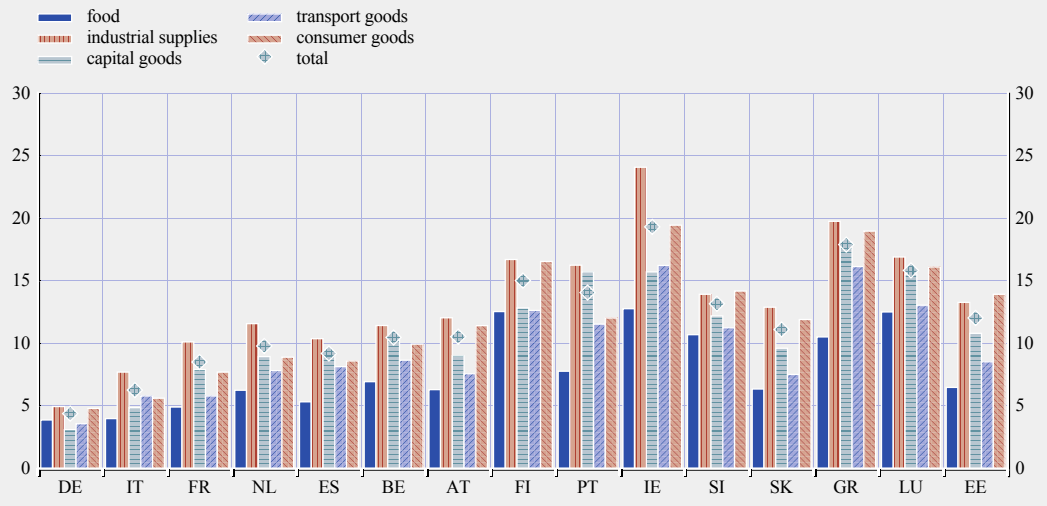
To alleviate this problem, two effects were added to the usual CMS effects: the effect that accounts for the trade lines on the extensive margin (extensive margin effect) and the effect that accounts for trade lines that the country of interest does not have, but that are present in the rest of the world (opportunity loss effect). Thus, the *intensive margin of trade* was decomposed into a structural effect (product, market and mixed product-market) and a competitiveness effect.

3 COMPNET TOOL TO MEASURE COMPETITIVE PRESSURES – DYNAMIC TRADE LINK ANALYSIS

A trade link refers to the information about whether a country exports a specific product at the 6-digit HS level to a given importing country or not, i.e. serves a particular "market" (see Benkovskis et al., 2012). Analysing the 1/0 pattern of trade links at two points in time, we get information on four different states of trade links for a given country A and a given market B, i.e. a trade link can be active, inactive, new or lost. Combining the information on the status of all trade links for exporter pairs — in our case always contrasting one specific euro area country with either the BRICs or all remaining euro area countries as a group — allows us to identify different forms of competitive

Chart A.3.1 Dynamic Trade Link Analysis: Crowding out by BRICs

(in percentage of reporter's existing trade links)



Source: Latvijas Banka/Oesterreichische Nationalbank calculations based on UN Comtrade.

Chart A3.2 Dynamic Trade Link Analysis: Crowding-out by other euro area countries

(in percentage of reporter's exixting trade links)

Source: Latvijas Banka/Oesterreichische Nationalbank calculations based on UN Comtrade.

pressure. As the number of existing trade links typically increases with the size of a country, we control for the size of the exporting country by excluding combinations of trade links where the euro area country is inactive (i.e. does not have an exporter status).

Chart A3.1. (competition from BRICs) and Chart A.3.2 (competition from other euro area countries) show the degree of crowding-out by end-use goods categories. Crowding-out is particularly strong in industrial supplies. Small peripheral euro area countries also face this type of competitive pressure strongly in capital goods from both BRIC and euro area competitors, while they are further crowded out by other euro area countries in food markets.

4 LIST OF COMPNET MEMBERS

Institution	Name	Surname	WS 1	WS 2	WS 3
Banca d'Italia	Antonio	Bassanetti	x		
Banca d'Italia	Matteo	Bugamelli		x	x
Banca d'Italia	Rita	Cappariello			x
Banca d'Italia	Davide	Castellani		x	
Banca d'Italia	Silvia	Fabiani	x		
Banca d'Italia	Sara	Formai		x	
Banca d'Italia	Francesco	Zollino	x		
Banca Națională a României	Bogdan Mihai	Chiriacescu		x	
Banca Națională a României	Alexandru	Leonte	x		
Banco Central de la Rep. Argentina	Laura	D´Amato		x	
Banco Central de la Rep. Argentina	Maximo	Sangiacomo		x	
Banco Central de Reserva del Perú	Rafael	Vera Tudela	x		
Banco de España	Cristina	Fernández	x		
Banco de España	Ana	Gómez Loscos	x		
Banco de España	Esther	Gordo	x		
Banco de España	Juan Francisco	Jimeno	x		
Banco de España	Paloma	López		x	
Banco de España	Antonio	Rodriguez		x	
Banco de España	Daniel	Santabarbara	x		
Banco de España	Patrocinio	Tello		x	
Banco de Portugal	J○ão	Amador (Head WS3)			x
Banco de Portugal	Paulo Soares	Esteves	x		
Banco de Portugal	Luca David	Opromolla		x	
Banco de Portugal	Pedro	Portugal		x	
Banka Slovenije	Urska	Cede	x	x	
Banka Slovenije	Andreja	Lenarcic	x	x	
Banka Slovenije	Matija	Lozej	x		
Banka Slovenije	Vesna	Lukovic		x	
Banque centrale du Luxembourg	Vincent	Scourneau	x		
Banque centrale du Luxembourg	Ladislaf	Wintr		x	
Banque de France	Antoine	Berthou (Head WS2)		x	
Banque de France	Pauline	Bourgeon	x		
Banque de France	Jean-Charles	Bricongne		x	
Banque de France	Laurent	Cligny (Admin)		x	
Banque de France	Lionel	Fontagné		x	
Banque de France	Guillaume	Gaulier		x	
Banque de France	Daniel	Mirza		x	
Banque de France	Charlotte	Sandoz Dit Bragard		x	
Banque de France	Patrick	Sevestre		x	
Banque de France	Jean-Marc	Thomassin		x	
Banque de France	Vincent	Vicard	x	x	
Banque de France	Soledad	Zignago	x	x	
Bocconi University	Carlo	Altomonte (consultant)		x	x
Bulgarian National Bank	Georgi	Momchilov	x		
Central Bank of Cyprus	Stephan	Haroutunian	x		
Central Bank of Ireland	Martina	Lawless		x	
Central Bank of Ireland	Derry	O'Brien			x
Central Bank of Malta	Alfred	Demarco			
Central Bank of Turkey	Soner	Başkaya	x	x	
Centro Studi Luca d'Agliano	Silvia	Cerisola		x	
Centro Studi Luca d'Agliano	Veronica	Lupi		x	
Česka Národni Banka	Tomas	Adam	x		
Česka Národni Banka	Kamil	Galuscak	x	x	x
Česka Národni Banka	Lubos	Ruzicka	x		x
Danmarks Nationalbank	Kim	Abildgren	x		
De Nederlandsche Bank	Steven	Poelhekke		x	x
De Nederlandsche Bank	Robert	Vermeulen	x		
Deutsche Bundesbank	Elena	Biewen		x	
Deutsche Bundesbank	Sven	Blank		x	
Deutsche Bundesbank	Christoph	Fischer	x		
Deutsche Bundesbank	Ulrich	Grosch	x		
Deutsche Bundesbank	Sabine	Hermann	x		

Institution	Name	Surname	WS 1	WS 2	WS 3
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Deutsche Bundesbank	Axel	Jochem	x		
Deutsche Bundesbank	Kirsten	Lommatzsch	x		
Deutsche Bundesbank	Philipp	Meinen		x	
Deutsche Bundesbank	Arne	Nagengast			x
European Central Bank	Chiara	Angeloni		x	
European Central Bank	Nicola	Benatti		x	
European Central Bank	Elena	Bojesteanu Bobeica	x		
European Central Bank	Styliani	Christodoulopoulou	x		
European Central Bank	Filippo	di Mauro (Chair)	x	x	x
European Central Bank	Alistair	Dieppe	x		
European Central Bank	Julia	Fritz (Admin)	x	x	x
European Central Bank	Oliver	Gloede			x
European Central Bank	Pavlos	Karadeloglou			
European Central Bank	Tohmas	Karlsson		x	
European Central Bank	Ana	Lamo		x	
European Central Bank	David	Lodge			
European Central Bank	Lucia	Orszaghova	x		x
European Central Bank	Chiara	Osbat (Head of WS1)	x		
European Central Bank	Selin	Özyurt			x
European Central Bank	Sebastien	Perez Duarte		x	
European Central Bank	Beatrice	Pierluigi	x		
European Central Bank	Gabor	Pula	x		x
European Central Bank	Matthias	Rau-Goehring	x		
European Central Bank	Rasmus	Rüffer	x		
European Central Bank	Lionel	Savelin			x
European Central Bank	Beatrice	Scheubel	x		
European Central Bank	Martin	Schmitz	x		
European Central Bank	Bernd	Schnatz			x
European Central Bank	Willem	Schudel	x		
European Central Bank	David	Sondermann	x		
European Central Bank	Melanie	Ward-Warmedinger	x		
European Central Bank	Nico	Zorell			x
Eesti Pank	Liina	Malk		x	
Eesti Pank	Jaanika	Merikyll		x	
Eesti Pank	Tairi	Rõõm		x	
Eesti Pank	Karsten	Staehr	x		
Eesti Pank	Natalja	Viilmann	x		
EU Commission	Jorge	Duran-Laguna		x	
EU Commission	Josefa	Monteagudo	x		
EU Commission	Dominique	Simonis	x		
EU Commission	Nuno	Sousa			x
EU Commission	Alessandra	Tucci		x	
EU Commission	Hylke	Vandenbussche		x	
EU Commission	Stefan	Zeugner	x		
EU Commission	Isabel	Grilo			
EU Commission/Trade	Henrik	Isakson		x	
European Commission	Benedicta	Marzinotto			
Federal Reserve System	John	Rogers	x		
Federal Reserve System	Benjamin	Mandel			
Hungarian Academy of Sciences	László	Halpern (consultant)		x	
International Monetary Fund	Rudolf	Bems	x		
Institut für Wirtschaftsforschung Halle	Hubert	Gabrisch	x		
Latvijas Banka	Konstantins	Benkovskis	x		
Lietuvos bankas	Aurelijus	Dabušinskas	x		
Lietuvos bankas	Ernestas	Virbickas			
London School of Economics	Gianmarco	Ottaviano			
Magyar Nemzeti Bank	Andras	Kovacs	x		
Magyar Nemzeti Bank	Péter	Harasztosi	x	x	
Magyar Nemzeti Bank	Gabor	Katay		x	
Národná banka Slovenska	Tibor	Lalinský		x	
Narodowy Bank Polski	Michal	Gradzewicz	x		

Institution	Name	Surname	WS 1	WS 2	WS 3
Narodowy Bank Polski	Jan	Hagemejer		x	
Narodowy Bank Polski	Wojciech	Mroczek	x		
National Bank of Romania	Bogdan	Chiriacescu		x	
Nationale Bank van België /Banque Nationale de Belgique	Emmanuel	Dhyne		x	x
Nationale Bank van België/ Banque Nationale de Belgique	Martine	Druant	x		x
Nationale Bank van België/ Banque Nationale de Belgique	Cédric	Duprez	x		
Nationale Bank van België/ Banque Nationale de Belgique	Catherine	Fuss		x	
Organisation for Economic Co-operation and Development	Sónia	Araújo	x		
Organisation for Economic Co-operation and Development	Koen	de Backer			x
Oesterreichische Nationalbank	Maria	Silgoner	x		
Oesterreichische Nationalbank	Alfred	Stiglbauer		x	
Oesterreichische Nationalbank	Julia	Wörz			x
Oesterreichische Nationalbank	Alfred	Stiglbauer			
Stanford University	Kalina	Manova			
Suomen Pankki	Juuso	Vanhala			x
Suomen Pankki	Jouko	Vilmunen			
University of Maryland	John	Haltiwanger		x	
University of Milan	Giorgio	Barba Navaretti (consultant)		x	
University Pompeu Fabra	Ramon	Xifré	x		
United States International Trade Commission	William	Powers		x	
United States International Trade Commission	Zhi	Wang			x
Vrije Universiteit	Eric	Bartelsman		x	
The Vienna Institute for International Economic Studies	Robert	Stehrer (consultant)			x
World Bank	Jose Guilherme	Reis		x	
World Bank	Daria	Taglioni		x	

5 PAST COMPNET WORKSHOPS/CONFERENCES[1]

CompNet Workshop 2 – 3 April 2012, European Central Bank, Frankfurt am Main

CompNet Workshop 20-21 September 2012, Banque de France, Paris

CompNet Workshop 10-11 December 2012, European Central Bank, Frankfurt am Main

CompNet Workshop 12-13 March 2013, Central Bank of Ireland, Dublin

CompNet joint Conference with Peterson Institute for International Economics and World Bank, 16-17 April 2013, Washington, DC: National Competitiveness, Scalability of International Value Chains, and Location of Production

1 http://www.ecb.int/home/html/researcher_compnet.en.html