EUROPEAN CENTRAL BANK

EUROSYSTEM

European firms after the crisis

New insights from the 5th vintage of the CompNet firm-level-based database

CompNet The Competitiveness Research Network

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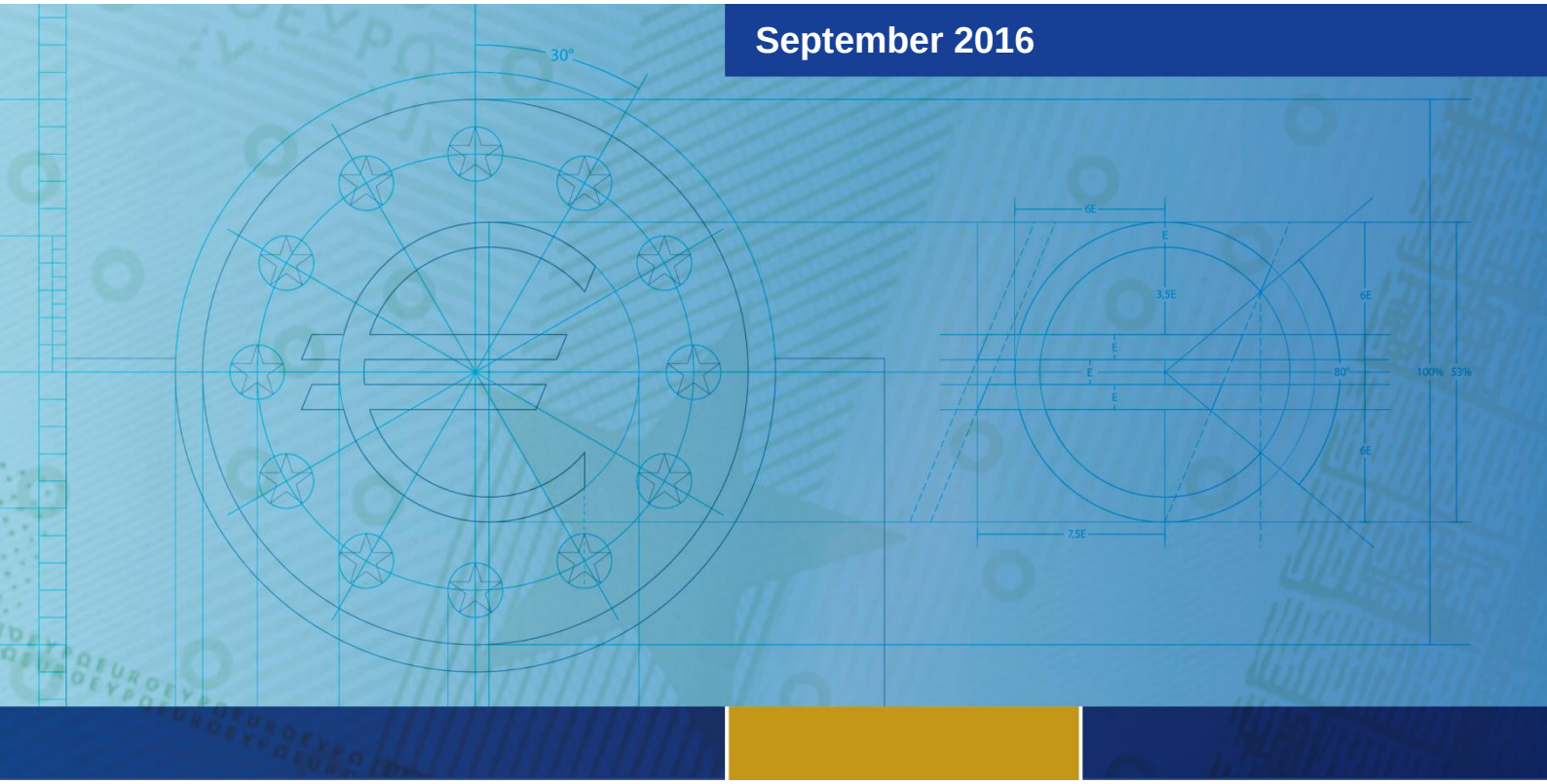

Note: This report has been prepared by the CompNet team, including researchers from the IWH (Halle). Responsibility for any error is of the authors and not of the ECB or the EU system of Central Banks.

Contents

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1 Introduction

Following the post-crisis talks and the recognition of a 'new normal' with higher unemployment, subdued economic growth and declining productivity growth, the new economic environment is characterized by ongoing structural policy reforms. Whether the European economies get trapped in the new normal or whether policy decisions will strengthen the longer run prospects will crucially depend on countries' level of competitiveness. Yet, enhancing competiveness is complex. It requires policies to focus on a broad range of factors affecting firms' productivity. They include among others strong institutions, efficient wage and price setting, well-functioning financial and labour markets and an efficient allocation of scarce resources across and within industries. These key ingredients will become even more important in the future as competitive economies show to be more resilient to shocks and better equipped to adapt rapidly to changes in the environment.

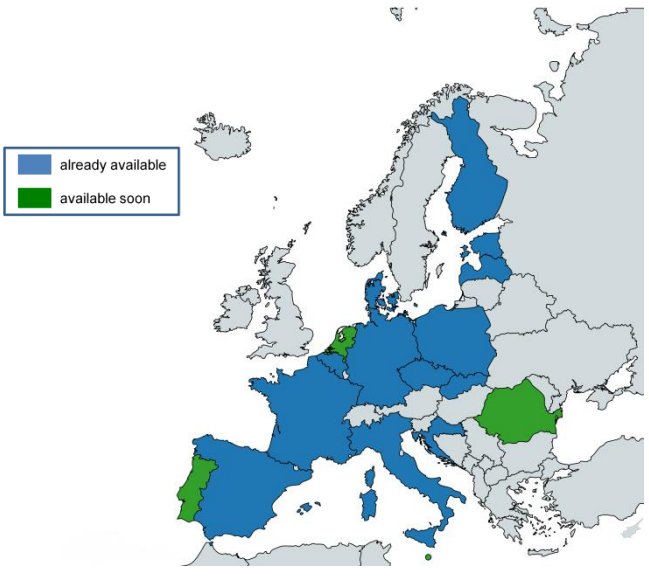
Given the above, this report intends to shed light on the competitive stance of European firms after the crisis. In line with CompNet cutting-edge approach, we take a firm-level perspective to analyse the competitive position of European firms by drawing from the new vintage of the firm-level-based CompNet database. This micro-level approach allows us to ascertain the extent in which firms performances are heterogeneous across EU, also in relation of possible determinants of such performance. A perspective which is essential to assess the structural factors underpinning good to less good performance among firms across countries and regions. And which is in turn a critical complement of the macroeconomic perspective that mostly relies on aggregated and average only information on output, prices and costs. The contribution of this report is a set of new stylised facts on firms' productivity dynamics, their financial state, employment growth and their performance on the international export markets. We compare countries' productivity distribution and assess whether there have been considerable shifts after the crisis, also in relation to the firms' exporting status. Special consideration will be also given to recent developments in firms' access to capital and their employment dynamics. Overall, the report provides some evidence that the 2013 was rather consistently across the board a 'turning point' for firms in Europe, although the extent of the recovery was still rather modest.

2 Coverage of CompNet data

Competitiveness gaps are increasingly associated with divergent economic developments, and they have been identified as a booster of disruptive economic downturns such as the recent EU crisis. As a result, restoring competitiveness is broadly acknowledged to be the key building block for achieving and maintaining growth, especially in the long run. When doing competitiveness analysis, it is crucial to take the degree and the nature of firm-level heterogeneity within individual countries and sectors into account. To do so, researchers have to undertake empirical analysis aimed at uncovering this heterogeneity, not solely relying on the average firm analysis. Economic research based on data that would allow taking this heterogeneity into account, has been hampered by issues of confidentiality and cross-country comparability. Building on members' expertise and existing national databases, CompNet has created and maintained a novel EU firm-level based database, which is unique in terms of its coverage and cross-dimensional analysis potential, as it links, for example, the financial status of firms with their productivity. The database is built on the "Distributed micro-data approach" developed by Bartelsman et al. (2004), it uses a common protocol to extract information from firm level data, and aggregates them in such a way to preserve confidentiality and ensure harmonized results.

Chart 1

Geographical coverage in the 5th round of CompNet



Sources: CompNet.

Already in its 5th vintage, the CompNet database comprises at the present 60 sectors for 13 European countries, for the period 1996-2013. Other countries expected to join the database, are Portugal, Malta and the Netherlands. In addition, CompNet is currently collaborating with the 'Productivity Commission' of New Zealand. This cooperation opens interesting research opportunities as it allows comparing the competitive stance of European firms to their counterparts worldwide.

Taking also into account the results from the previous CompNet vintage (with data up to 2012), the database comprises already a total of 19 EU countries on a disaggregated sector (2-digit level according to the NACE rev. 2) and macro-sector (1-digit) level. The data is available for two samples[1]: the 'full' sample which covers the entire universe of firms, and the so-called '20E' sample covering only firms with more than 20 employees. A sample re-weighting technique has been also carried out in order to increase the representativeness of the 20E firm sample. This technique applies the so-called *population weights* based on the total number of

[1] Target populations are defined with few exceptions (6) in the same way across countries, aiming at nonfinancial corporations consistent with the definition of category S11 in the European System of Accounts (that is, excluding sole proprietors).

firms in each country, year, macro-sector and size class, as derived from Eurostat Structural Business Statistics (SBS) (which is taken as representing the population). By using population weights we are able to replicate the actual composition of the universe of firms in terms of size classes. This sample is particularly suited for qualitative and graphical analysis and comparisons.

Table 1 presents the country coverage of the CompNet database with respect to the total number of firms, total employment and real value added that are retrieved from Eurostat. Column 1 and 2 report the coverage of firms (the average number per year) and employment vis-à-vis the population of firms with at least 1 employee[2] operating in the sectors included in CompNet. Columns 3 and 4 show the coverage of CompNet with respect to the overall economy, i.e. total value added and employment.

The coverage has improved substantially compared to the previous rounds for key employment and production statistics, and particularly with respect to the total number of employees covered by the firms sampled. For example, the coverage of Italian firms has increased by 10 percentage points for total employment within the CompNet macro-sectors. It should be noted, however, that there are still cross-country differences in terms of sample representativeness.

Table 1

Coverage of the 5th vintage of the CompNet data with respect to key statistics

	Coverage vs. same population of firms[3]		Coverage vs. National Accounts[4]	
Country	# of firms	Tot. Employment	Value added	Tot. Employment
Belgium	23.3%	79.0%	32.8%	40.1%
Croatia	40.0%	86.4%	36.9%	49.6%
Czech Republic	5.8%	69.8%	17.4%	38.5%
Denmark	69.4%	63.5%	56.3%	27.9%
Estonia	66.7%	89.8%	7.3%	28.3%
Finland	44.1%	83.1%	42.0%	48.4%
France	86.2%	89.0%	46.3%	63.2%
Italy	10.7%	65.0%	20.4%	33.8%
Latvia	59.9%	88.4%	28.1%	48.6%
Poland	75.9%	90.9%	23.5%	58.4%
Germany[5]	37.0%	72.8%	18.3%	12.9%
Spain	17.5%	47.1%	50.7%	30.1%

2 For Denmark, France, Poland and Germany only data on the 20E sample is available. Slovakia does not provide unweighted numbers which is why it is not included in the table.

3 Coverage is computed over the period 2005-2007, with the exception of Estonia (both 2006-2007), Malta and Croatia (both 2008-2009). Data of the population of firms with at least 1 employee was retrieved from Eurostat.

4 Coverage of the whole economy (not only firms of the private sector) is computed for 2005. Eurostat data comes from National accounts series nama_gdp_c and nama_aux_pem, respectively.

5 AfiD firm-database

Box 1

The German data: key figures from the AFiD firm-database

One of the key features of this 5th round of data collection is the inclusion of an alternative data set for Germany, made available by the Halle Institute of Economic Research (IWH) in the context of its partnership with CompNet. It is important to underline however, that the insertion of this dataset within CompNet is at this stage only preliminary. In particular, the dataset at this stage does not allow a fully satisfactory comparison with the dataset of other countries, given a shorter time coverage, as well as the unavailability of the service sector. This notwithstanding, the data set presents a number of promising features which will need to be fully examined and exploited also in cooperation with other German institutions.

The dataset in question (AFiD, which stands for 'Amtliche Firmendaten für Deutschland', i.e. official German firm-level data) is an unbalanced, representative panel of manufacturing firms with at least 20 employees for the period between 2001 and 2012. The data is collected by the statistical offices of Germany. Its time span will soon be extended from 1995 to 2014 and will also cover the service macro-sector. The data originates from different modules covering different topics and dimensions of firms' activities.

Overall, the sample is rather representative for firms with at least 20 employees, which are obliged by law to provide information on their business activities. This ensures the highest possible quality of the information and reduces missing values to a minimum. A notable exception is the cost module, from where one derives information (e.g. investment and depreciation) needed to calculate the capital stock, intermediate inputs, as well as R&D-activities. Within this module, only the largest firms (with at least 500 employees) are required to provide the information on a yearly basis and such info is included in the database. For the smaller firms instead (from 20 to 500 employees) information is based on a representative subsample which is drawn every 4 years. It covers ca. 38% of total employment and 45% of total revenue in this size class.

In terms of firms covered, the AFiD dataset includes complete information, i.e. including also the cost module, on yearly basis for around 15,000 distinct firms. Over the period 2001-2012, the dataset includes in total about 40,000 distinct firms per year, which account for about 6 million employees.

Compared to the previous (4th) CompNet vintage the number of German manufacturing firms sampled is higher (by around 1 thousand firms per year as it can be seen from Chart 2) and, even most importantly, less erratic. As it can also be seen in Chart 2, the number of German firms included in the sample in the 4th vintage dropped sharply around the time of the Great Recession. This highlights that, in such period, previously used German data might have been more strongly biased towards larger and internationally integrated firms. All assessments of the relative strengths of the two datasets will need however to be confirmed by more detailed statistical assessments, which are already being planned..

Chart 2

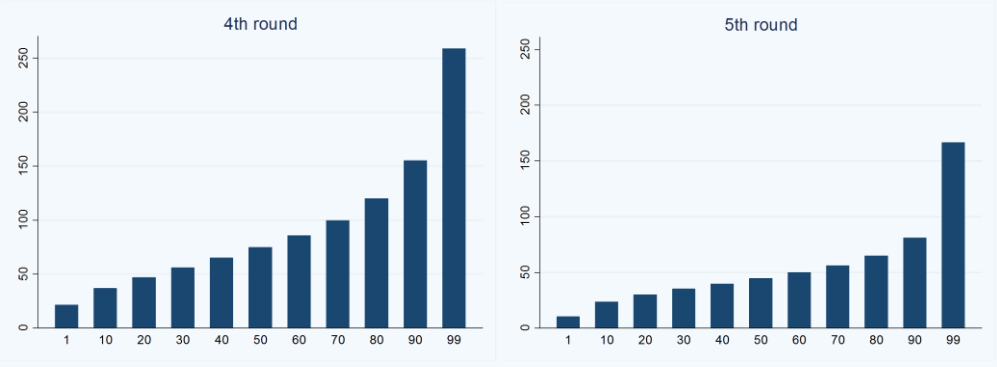
Comparison of the number of manufacturing firms sampled in Germany

Source: CompNet, 20E sample.

Finally, in support of the reduction of a possible "large firms' bias", Chart 3 compares the labor productivity distribution of the new German data to the 4th vintage one. The average labor productivity is much lower across all productivity deciles, while the overall distribution shows the right fat-tail (i.e. relatively few, exceptionally productive firms) widely found in the literature. This result would be consistent with the view that the new data for Germany in CompNet may represent fairly well the actual firm size distribution, not overweighting the importance of larger firms.

Chart 3

Labour productivity per productivity class



Source: CompNet, 20E sample.

Given the leading role that Germany plays in the European economy, a representative dataset, with a smaller bias, is particularly important to assess competitiveness within the European markets. Going forward is critical that efforts will be made to ensure high level of representativeness of the German sample, also in order to ensure adequate cross country comparability.

2.1 Comparison with Eurostat data

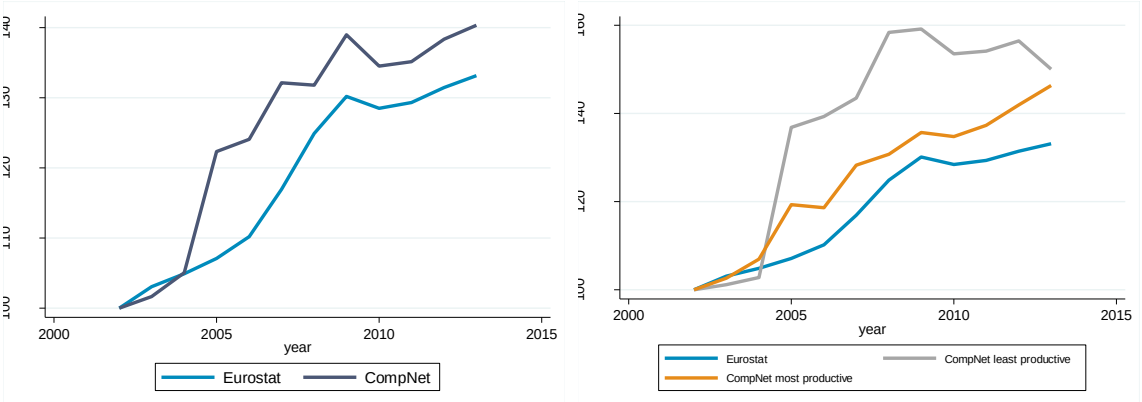
The CompNet database is a valuable tool for research on topics related to competitiveness, productivity and country's export performance, and it offers researchers a critical input for well-founded policy making. As the following examples show, the average of selected variables of the database, such as unit labour cost (ULC), tracks rather well the corresponding average reported in the aggregate by Euorostat. This is reassuring as it shows that the data set – although being micro founded - reflect rather well the bulk of macro developments. With respect to the Eurostat, however, our database offers much richer information on the entire distribution of the indicators included.

Chart 4 portrays the dynamics of ULC the countries included in the 5th vintage of the CompNet data. The panel on the left shows the mean at the country level from Eurostat compared to the country-level information contained in CompNet. Deviancies between Eurostat and CompNet in terms of sectoral coverage might result in harsher changes for the CompNet variables. Yet, whereas the CompNet mean shows a steeper pattern, the trend is very comparable. The advantage of CompNet is, however, that it allows assessing unit labour cost dynamics for certain groups of firms along the deciles of the labour productivity distribution, while Eurostat has data only for the unconditional mean. The panel on the right of Chart 4 illustrates CompNet richness; it displays the ULC levels for the least and most productive firms in terms of labour productivity. As can be seen, CompNet data substantiates that the impact of the crisis has been different for the most and least productive firms, a critical fact that raises concerns on whether policies built up on average firms can ultimately have the 'desired' impact.

Chart 4

Evolution of unit labour costs for firms between 2002 and 2013

Notes: unweighted average across all available countries.



Source: Eurostat and CompNet, full sample.

2.2 Other firm-level-based databases for research

The CompNet database is unique also with respect to other available firm-level-based databases, such as AMADEUS. For example, the coverage of CompNet is much richer with respect to firms' employment and trade information. Moreover, CompNet members have made substantial efforts to improve cross-country comparability, taking into account differences in variable definition and measurement. Box 1 sketches some of the pros and cons of the CompNet database for conducting competitiveness analysis compared to the commercial AMADEUS database version available in the ECB.

Box 2[6]

The use of firm-based information to assess competitiveness: CompNet vs. AMADEUS[7]

Access to firm-level data has become increasingly important for research and policy analysis on competitiveness. In this context, commercial databases like AMADEUS or ORBIS, from the Bureau Van Dijk, have until recently been the closest proxy to a pan-European firm-level database. Bureau Van Dijk (BvD) collects publicly available business records from national providers drawing mostly from administrative sources. AMADEUS is the European version of the database, with information on around 21 million companies across all 28 European countries. Company financials are provided in a standard format to facilitate cross-country comparisons. Once subscribed, the users can download company balance sheets and income statements from the disks or Internet. Given the above, AMADEUS is a very valuable tool for researchers interested in firm level data.

The AMADEUS database has, however, several limitations with respect to its use for competitiveness analysis:

1. Firm coverage is relatively poor and biased to manufacturing and large firms in some countries where provision of employment information is not compulsory or widespread.
2. There is very limited information on the export activity of the firm which is considered to be a fundamental for competitiveness analysis.
3. The time and computing power required for cross-country analysis on Amadeus data is excessive and does not facilitate country benchmarking analysis.

In this context, the micro-aggregated database of CompNet fills some gaps, above all in terms of provision of joint distributions of productivity and exports but also in terms of

[6] This box draws from an internal note of DG Economics entitled "The use of firm-based information for an enhanced assessment of competitiveness: Pros and cons of AMADEUS and COMPNET" authored by Paloma Lopez-Garcia.

[7] The AMADEUS data used for this comparison are obtained from ad-hoc petitions to Bureau van Dijk as well as downloads from their webpage. In this sense, the AMADEUS data available at the ECB are superior to the data one could independently download from the web of the provider although inferior to other AMADEUS-ORBIS databases like the one documented in Kalelim-Ozcam et al. (2015), constructed after merging several vintages of both ORBIS and AMADEUS.

accessibility given that the data compilation process is decentralised and, therefore, quite efficient.

Secondly, firm coverage in CompNet is better than in AMADEUS for countries (e.g. for Italy and Belgium) where employment information is not compulsory or widespread as CompNet's national counterparts are able to complement the balance sheet information of firms with other sources to fill missing gaps, and worse for countries (e.g. Germany) where NCBs have access to information on the basis of a selected sample of firms. For other countries (e.g. Spain) the coverage is broadly the same.

CompNet has in turn some drawbacks which need to be addressed. They are related to: (i) the country coverage which is still incomplete within the EU; (ii) some discontinuities in data provision given that not all countries participate regularly in data updates; (iii) an unrepresentative firm sample for some countries; (iv) lack of raw firm level data.

3 Productivity developments

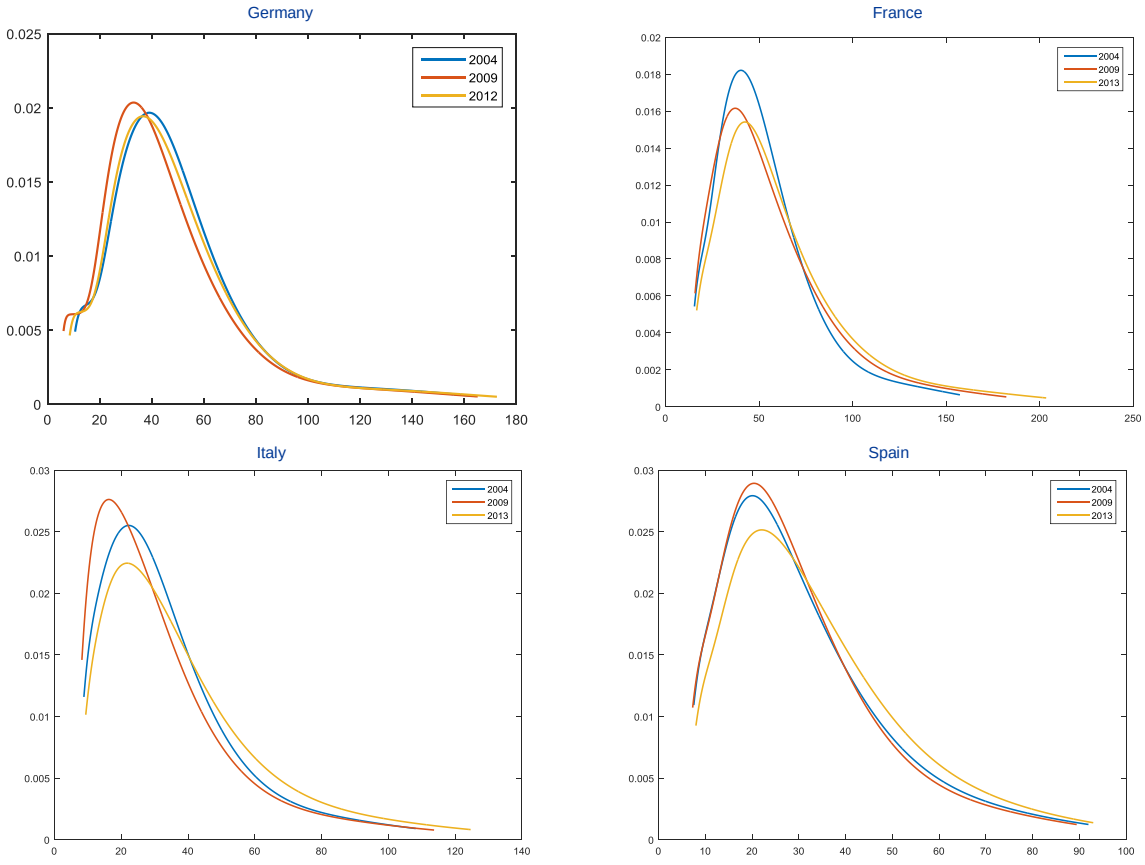
3.1 Density estimation of labour productivity distribution

One of the key strengths of the CompNet database is the inclusion of sufficient moments of the productivity distribution so to represent productivity density kernels for each country/sector/year. Chart 5 shows a number of kernels computed by interpolating the available moments of the distribution. We focus on the manufacturing sector to limit compositional effects, and we use the population weighted sample of firms with more than 20 employees to ensure cross-country comparability. The available data allows now to conduct cross-country comparisons and to analyse the within-country dynamics over time[8].

Chart 5

Labour productivity distribution over time (in '000 €)

Manufacturing macro-sector



Sources: CompNet, 20E sample.

[8] It should be noted that we do not necessarily refer to statistically significant shifts of the distribution. Moreover, given that CompNet data are obtained by repeated cross-sections, shifts in the distribution might be also caused by changes in the firm sample across time.

The most notable feature of the kernels in Chart 5 is the accumulation of density around low productivity levels and the long right-tail of the distribution in all countries included in our sample. That is to say, that there is a relatively large share of firms with low productivity and only few firms operating at high levels of productivity. Mayer and Ottaviano (2008) call particularly high productive firms the 'happy few'.

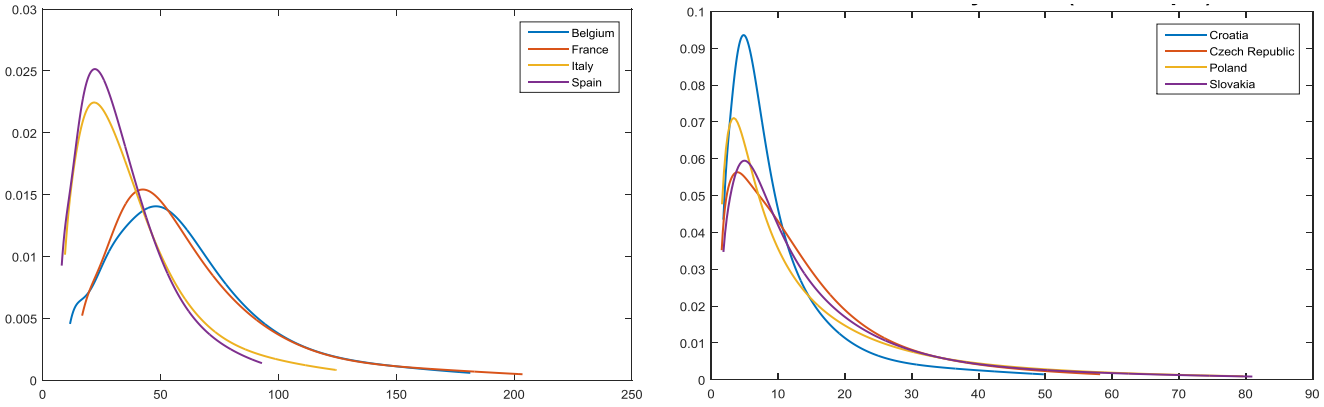
Looking at the shifts of the productivity distribution over time, Chart 5 illustrates that the impact of the crisis was very different across countries. While the productivity distribution for Italy, Spain and Germany features a shift to the left following the crisis, for France it moved to the right over time. In 2013, also Italy and Spain reported a right-ward shift in their productivity distribution relative to the period ex-ante the crisis, meaning that the relative share of more productive firms has increased in recent times. Germany interestingly seems to not fully reached the pre-crisis-levels. It for sure calls for further investigations.

Chart 6 allows comparing the labour distribution in 2013 within country groups. The labour productivity distribution is heterogeneous across countries. For instance, among the group of 'core' European countries, Belgium and France display thicker tails (indicating a larger share of more productive firms) and a larger dispersion, while the opposite is true for Italy and Spain. For central European countries, instead, the distributions feature smaller dispersions, showing that the bulk of firms are on low productivity levels.

Chart 6

Labour productivity (in '000 €) for selected European countries in 2013

Manufacturing macro-sector



Source: CompNet, 20E sample.

4 Trade and export dynamics

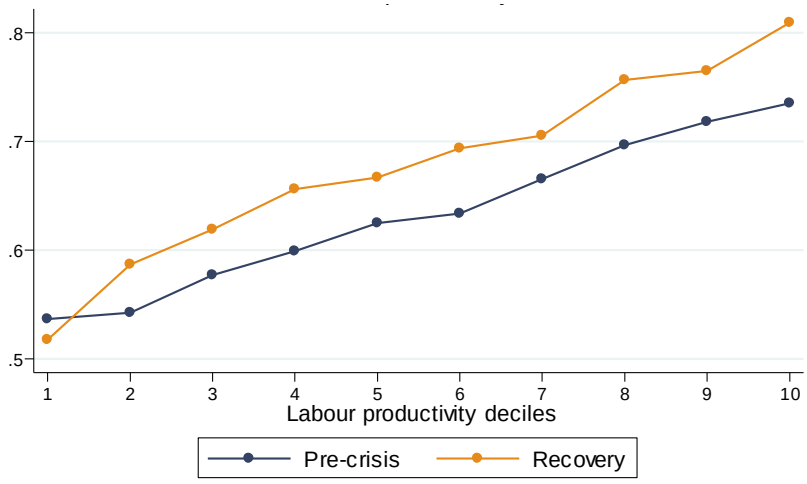
Country's competitiveness is often associated with successful trade performance. For this reason, trade performance is at the core of CompNet work in terms of research. A thorough study of productivity has to distinguish between exporters and non-exporters to better understand where the gains/losses in competitiveness come from. Looking at the average firm can mislead researchers studying trade dynamics. In fact European exporters and domestic firms are diverse with respect to their productivity and cost structure, and thus react differently to policies and shocks.

In the 5th round of the CompNet database, we collected data on firms by exporting status (i.e. exporter, permanent exporter, new exporter, non-exporter and temporary exporters[9]). We have information regarding their financial situation, their productivity and their competitive position until to 2013. Overall, the data suggests that 2013 has been the first year of a substantial recovery and 'real' turning point.

Chart 7 shows that the number of exporting firms in 2013 has relatively increased compared to the pre-crisis period, even though the change is only small.

Chart 7

Share of exporting firms by labour productivity decile



Average across countries; weighted by value added.

Source: CompNet, 20E sample. The label 'Pre-crisis' corresponds to the years before 2008 and 'Recovery' corresponds to the year 2013.

9 CompNet distinguishes several definitions for exporters: 'Exporter': if the balance sheets report a minimum turnover of 1.000 EUR from sales in a different country in the observed year. 'Permanent exporter': if the balance sheets report minimum turnover of 1.000 EUR from sales in a different country in the observed year as well as the previous and the next ones. 'New exporter': if the balance sheets report minimum turnover of 1.000 EUR from sales in a different country in the observed year as well as the next one. 'Non exporter': if the balance sheets do not report any turnover from sales in a different country in the observed year. 'Permanent non exporter': if the balance sheets report turnover from sales in a different country neither in the observed year nor the previous nor the next ones. 'Temporary exporter': if the balance sheets report minimum turnover of 1.000 EUR from sales in a different country in the observed year but not in the previous and next year.

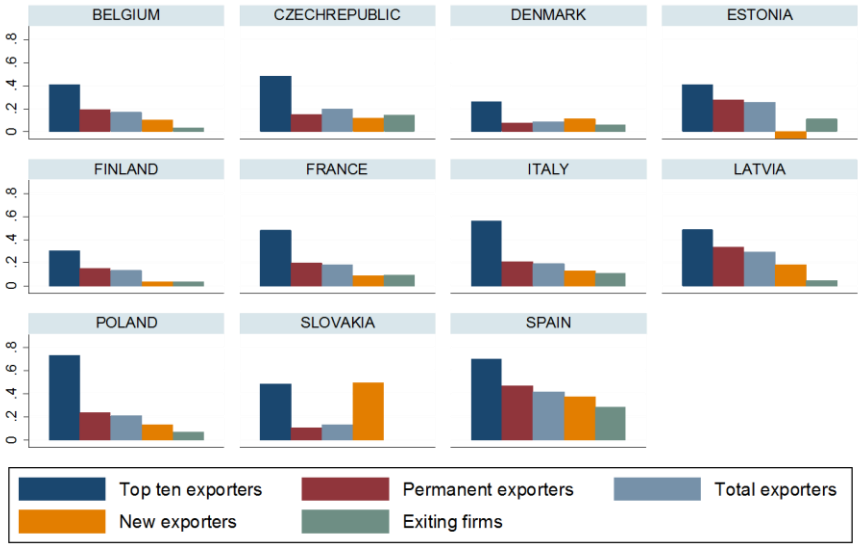
This change might be driven by different dynamics: the exporter firms better survived the crisis or the crisis in the European market gave an impulse to the process of internationalization of firms. Other explanations are also possible and in order to assess the cause of such change further analysis are needed.

Chart 7 shows also that the share of firms operating abroad is higher the higher the productivity level, with more than 80% of the most productive firms operating in markets abroad in 2013. Compared to the situation before the recent economic crisis, we can see that the difference in the share of exporting firms accounts to around five percentage points for each productivity decile. The observation does not hold for the least productive firms. As it can be seen from the chart, only half of the firms in this group are exporting – around 2 percentage points less than before the crisis. The higher share of exporting firms could be the result of a stagnating domestic demand, pushing firms to enter foreign markets. Nonetheless, the increased share of exporting firms could also indicate that non-exporters have left the market during the crisis thus increasing the relative amount of exporters. By all means, the relevance of exports has increased over time reinforcing the need of a detailed study of such trade dynamics.

Chart 8

Export premium by firms' export status

Averages for the years 2004 to 2013; data for Spain only available from 2007 on.



Source: CompNet, 20e sample. All sample only for Spain

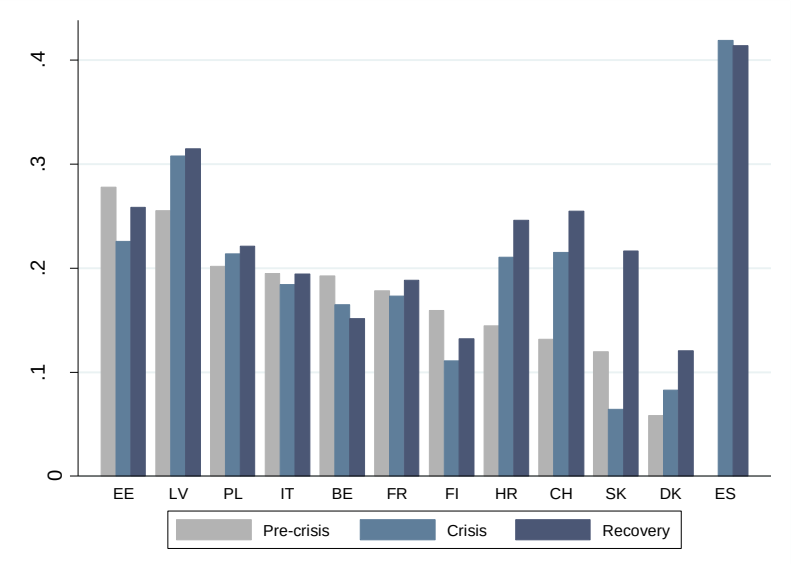
Chart 8 depicts the percentage difference in labour productivity between exporters and non-exporters, which is often called the "export premium". It suggests that there is a positive correlation between labour productivity and export status, meaning that exporters have in general a higher productivity. The export premium can be attributed to both the existence of efficiency requirements to operate in foreign markets and to the productivity enhancing spillovers from other exporters. Going to a more granular level, we can see that productivity is substantially higher for the top ten exporters (between 20pp higher in Finland and 80pp higher in Poland) and for

permanent exporters (on average 20% higher across all countries). These results have been confirmed by others, e.g. Berthou (2015) argues that "this evidence suggests that […] productivity is also an important determinant of firms' survival over a longer time period".

Chart 9 illustrates for the whole sample of exporters the evolution of the export productivity premium before, during and after the crisis. Overall we can see that the export premium is changing substantially over time. From a dynamic perspective, we can notice that the average export premium across countries, decreased during the crisis, with the exception of few Eastern European countries, while it rebounded in the aftermath of the crisis.

Chart 9

Evolution of export premium



Source: CompNet, 20E sample; the label 'Pre-crisis' corresponds to the years before 2008, 'Crisis' corresponds to the time from 2008 to 2012 and 'Recovery' corresponds to the year 2013.

Box 3

Joint distributions in CompNet

The CompNet database includes around 200 joint distributions connecting productivity with a number of critical covariates at the firm level, such as size, financial position, exporting status, employment creation or price-cost margins. Technically speaking, the joint distribution is a vector of conditional means or medians. For instance, we can know for each decile of the labour productivity distribution, what the share of exporters is. It is also possible for example to obtain the share of credit constrained firms by deciles of productivity distribution. Put differently, from the joint distribution we get:

$$E(SAFE_i | \, lprod_i \in P10(lprod))$$
$$E(SAFE_i | \, lprod_i \in P20(lprod))$$

This allows keeping the richness of the firm-level information that would get otherwise lost once the raw data is aggregated due to the inability of tracking single firms.

5 Employment and labour dynamics

The CompNet database on labour offers three powerful tools to investigate employment dynamics: the "percentage growth" dataset, the size class dataset, and the "size quintile" dataset. The percentage growth dataset offers data on the relative growth of firms. To do so it classifies firms in different categories defined by the cumulative percentage growth of employment over a three-year period: decline, equal, growth, high growth and very high growth[10]. This dataset is suitable to study the performance of firms belonging to different growth categories, e.g. the distribution of unit labour cost within each growth class. The size class and the labour productivity quintile dataset are instead built on transition matrices. A more detailed description of the matrices can be found in Box 4. The size class dataset defines employment growth as a change in size class between year t and t+3. In each year, firms are assigned to different size classes depending on their employment level: from 1 to 9 employees, from 10 to 19 employees, from 20 to 49 employees, from 50 to 249 employees, and more than 250 employees. Then, within each three-year period the firm in classified as growing, equal or declining according to its jump from one size class to the other. The size quintile dataset instead measures employment growth in terms of change of quintile, within the firm size distribution of the sector of reference between time t and t+3.The transition matrices on firms' size class or quintile in which it belongs are suitable to perform analysis of threshold effects. For example, study the effect of employment legislation that binds only large firms. The transition matrices built on the distribution of size offer the possibility to undertake a more granular analysis as size classes are very broadly defined.

Box 4

Transition matrices in CompNet

CompNet transition matrices are a useful tool to tracks firms' movements along the employment growth dimension. CompNet transition matrices have been constructed for each sector, providing the share of firms of a given size class increasing or reducing their employment over a three-year horizon, similarly to what has been also done within the framework of the OECD DynEmp project.

The CompNet labour module[11] differs from available datasets in a number of important aspects. First, it provides also data on the moments of the employment distribution. Second, the coverage is extended to 17 EU countries (13 Euro Area), which allows researchers to focus on the European case and to assess the impact of the Great Recession. Third, with 9 macro-sectors the CompNet dataset allows to cover a wider range of sectors than in earlier

[10] Decline: employment growth < -3.03%; Equal: -3.03%<employment growth<3.03%; Growth: 3.03%<employment growth<33.1%; High growth: 33.1%<employment growth<72.8%; Very high growth: employment growth>72.8%. The thresholds 3.03%, 33.1% and 72.8% corresponds to an average annual growth of 1%, 10% and 20%.

[11] Relevant inputs have been taken from Fernández C. et al. (2015), "Firm growth in Europe: an overview based on the CompNet Labour module"

studies. Fourth, a large set of covariates – including the financial position of the firm, labour and total factor productivity, unit labour costs, mark-ups, etc. – are computed for firms in each cell of the transition matrices.

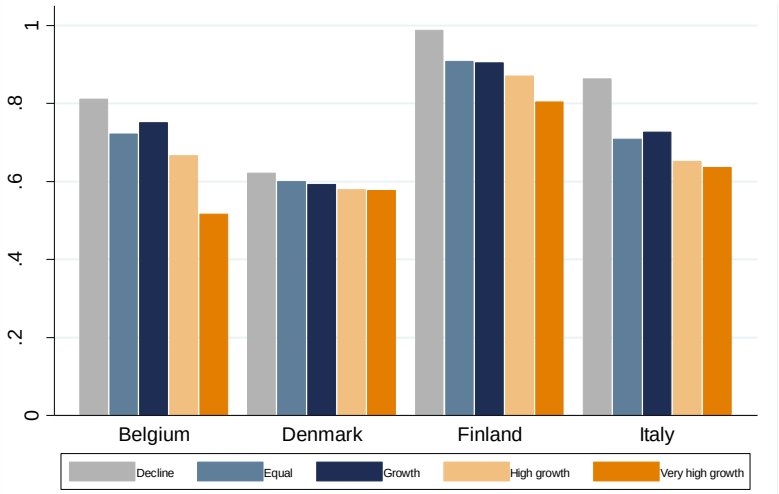
Besides containing information on firm growth, each of the 3 datasets collects information on the characteristics of each type of firm, defined in terms of its initial size or quintile and its growth over the three-year period. That is, firm's characteristics before the growing or shrinking episode are provided.

5.1 Firm size class dynamics

In the literature it is widely documented and accepted that most jobs are created by a small number of firms reaching considerable employment growth. For this reason, CompNet has been including in the “percentage growth” dataset a category of firms labelled “high-growth” firms.

By using the CompNet database it is possible to highlight some common features and patterns of high-growth firms. Chart 10 illustrates the unit labour cost of firms in each growth class in 2013. It can be seen that among the expanding firms, unit labour cost is generally lower compared to those firms that are shrinking or stagnating in terms of employment.

Chart 10
Unit labour cost by firms’ employment growth class in 2013



Notes: CompNet, full sample.

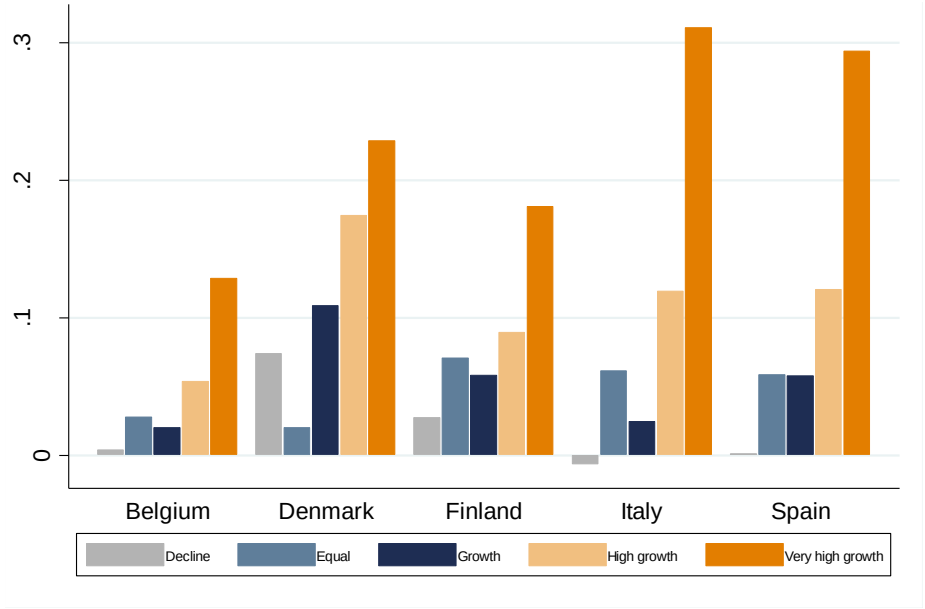
Since unit labour cost is defined as labour cost over real value added, the low ULC for growing firms could be due to a lower cost of labour, a higher productivity or a combination of these factors. More in-depth studies show that it is indeed the high productivity of such firms to boost their employment growth and not a differential in the salaries of their employees given that high-growth firms have higher labour cost per employees compared to the other classes.

However, we suggest proceeding with more in-deep analysis in order to test for compositional or mechanical effects. Indeed, it might be the case that high growth firms are the smaller ones, which often try to keep the labour force undersized.

Chart 10 illustrates that high-growth firms are also characterized by substantial levels of growth in terms of TFP. Other relevant features of high-growth firms have been discussed in the Labour module of CompNet where the authors study the links between some firms' characteristics and the probability of growth[12].

Chart 11

TFP growth by employment growth category



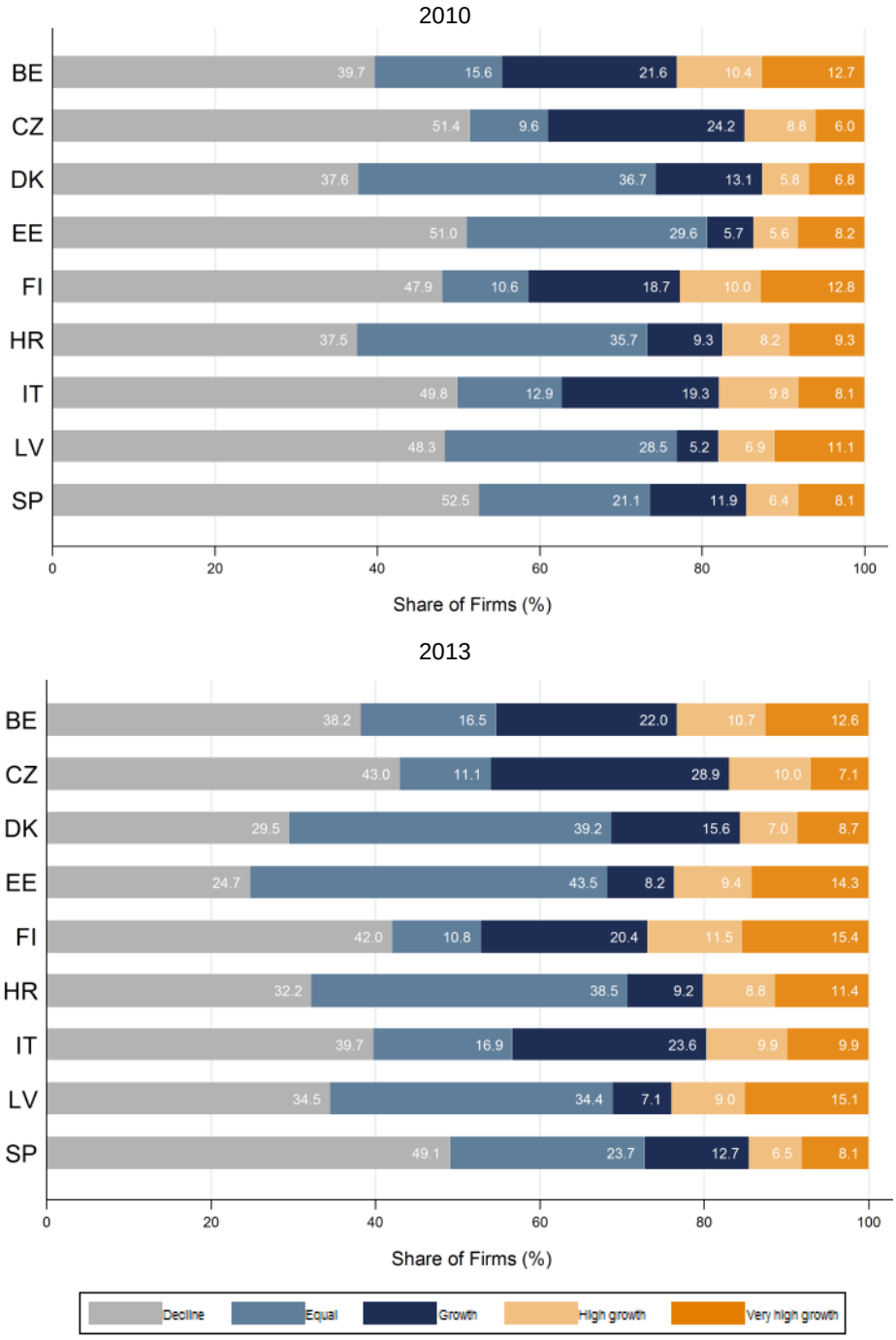
Notes: CompNet, full sample; the label 'Crisis' corresponds to the time from 2008 to 2012 and 'Recovery' corresponds to the year 2013

The data of the CompNet labour module can also help to better understand under which conditions and in which environment the share of growing firms is higher. Chart 11 shows some facts on firms' growth dynamics over time drawn from the most recent round of CompNet data collection, the 2013. The overall impression is that more firms are classified as growing, while fewer firms are classified as shrinking or stagnating in 2013 in comparison to 2010.

[12] Relevant inputs have been taken from Fernández C. et al. (2015), "Firm growth in Europe: an overview based on the CompNet Labour module"

Chart 12

Firms' growth dynamics during (2010) and after (2013) the crisis



Notes: CompNet, full sample.

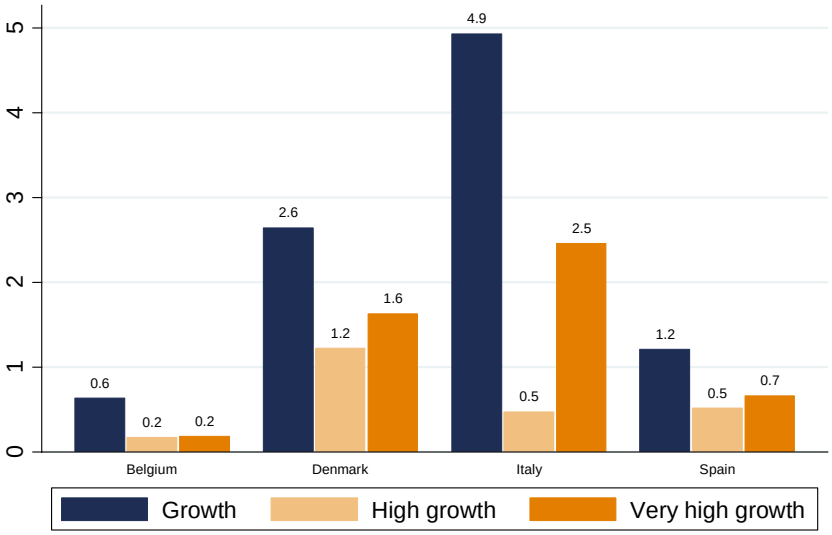
On average more than one third of the sampled firms have expanded their employment base – with some reaching remarkably high levels of growth.

2013 appears to be a good year in terms of employment growth also when compared with the employment dynamics that have been occurring in the crisis

period. Chart 13 displays the difference in the share of growing firms between the average over the 2008-2012 and the 2013.

Chart 13

Change in the share of growing firms between the crisis and the recovery



Notes: CompNet, full sample; the label 'Crisis' corresponds to the time from 2008 to 2012 and 'Recovery' corresponds to the year 2013

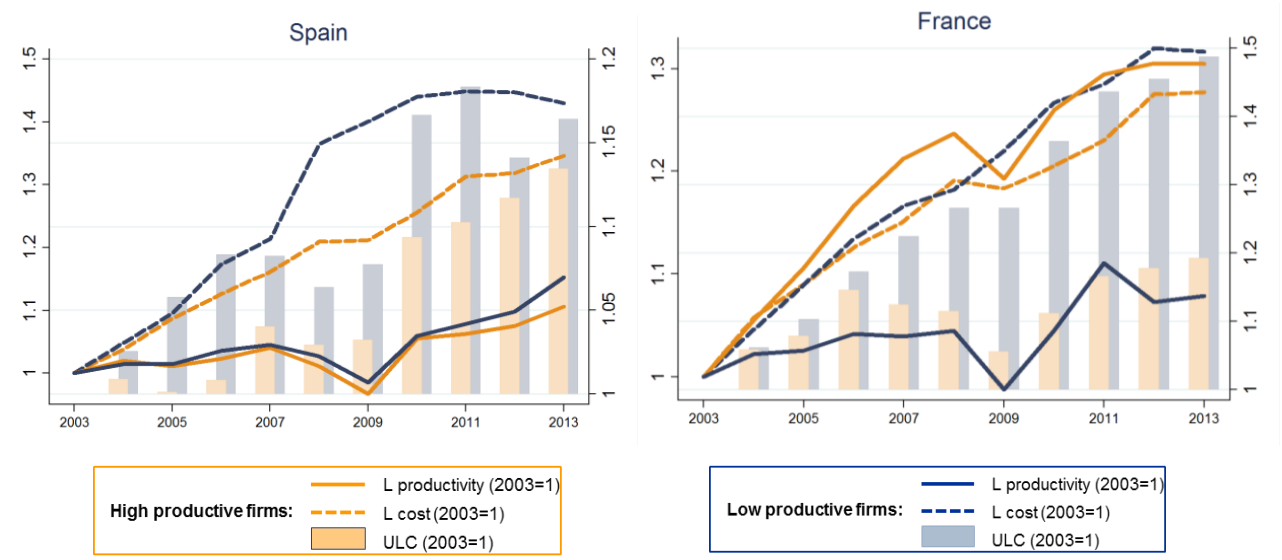
It can be seen from Chart 13 that for most countries the share of high-growth firms increased in the latest period.

5.2 Trends in labour cost

The unit labour cost is a suitable measure to make cross country comparison about the employment structure. In particular, we can see how 'difficult' it is for companies to hire new employees and how much it is related to the labour productivity. On the latter. Chart 14 sheds light on the relation between wages and labour productivity. Drawing from the joint distributions in the CompNet database, it depicts both the situation for the least and the most productive firms in terms of labour cost per employee. As it can be seen from the chart, labour productivity and cost does not move in parallel but features a "misalignment". In the case of Spain, labour costs are gradually increasing over time while productivity is rather stagnating, especially before the crisis. In France instead, labour cost and productivity diverge significantly, but only for the least productive firms.

Chart 14

Comparison of labour cost and productivity evolution for Spain and France



Notes: CompNet, full sample.

6 Financial module

6.1 Credit constraints for firms

CompNet has a set of indicators that provide a concise picture of the financial condition of firms. One of CompNet's main contributions in terms of financial research is the analysis of credit allocation. To this end, CompNet has constructed a firm-level "indicator of credit constraints" (ICC), using balance sheets data and profit and loss accounts of firms, all together with a survey of bank lending (SAFE). Box 5 presents the approach to compute this indicator.

Box 5

Indicator of Credit Constraint (ICC): technical background

The ICC is computed drawing from the Survey on Access to Finance of Enterprises (SAFE), which is conducted by the ECB jointly with the European Commission twice per year. The survey intends to assess the financial condition of firms in the euro area. It defines a firm as credit constrained when:

- The firm reports loan applications which were rejected;
- The firm reports loan applications for which only a limited amount was granted;
- The firm reports loan applications which were rejected by the firms because the borrowing costs were too high;
- The firm did not apply for a loan for fear of rejection (i.e. discouraged borrowers).

This survey allows us to compute the share of credit constrained firms in a specific sector for a particular year. By using financial balance sheet data from the AMADEUS database and the results of the SAFE survey, we estimate a regression to model the probability of being credit constrained. The regression has the following form:

$$SAFE_{\text{score,i}} = -1.88 + 0.71 \cdot finlev_i + 0.28 \cdot ifp_i - 0.51 \cdot pm_i - 0.21 \cdot coll_i - 1.2 \cdot cashH_i - 0.05 \ln(TA_i),$$

where $finlev_i$ is the financial leverage, ifp_i is the index of financial pressure, pm_i is profit margin, $coll_i$ is collateral, $cashH_i$ is cash holding and TA_i are the total assets for firm i.

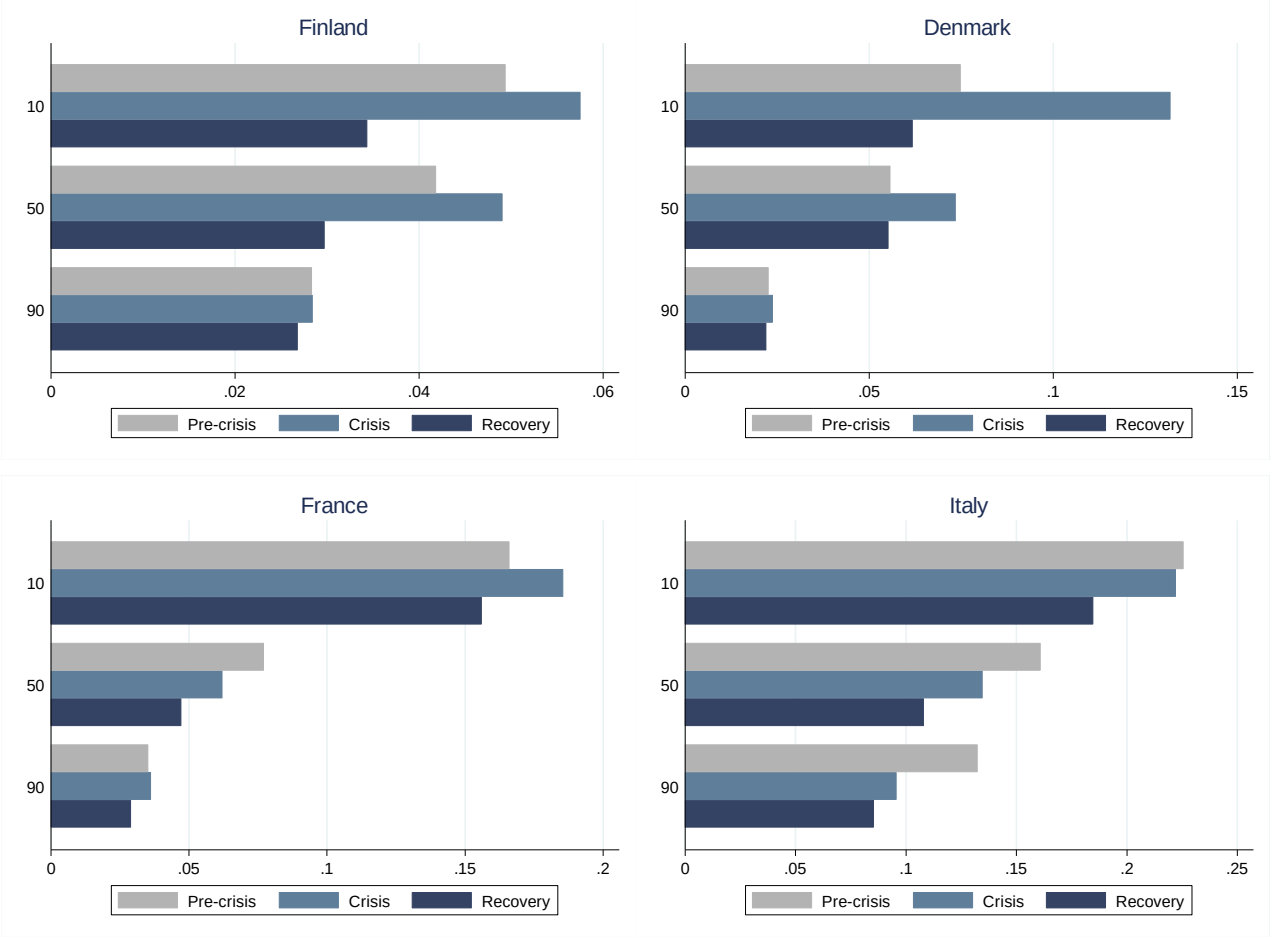
From the fitted regression values we obtain the distribution of the SAFE score estimates. The SAFE survey provides information on the share of firms that are credit constrained for a given sector and year. We fix a threshold of the fitted SAFE score for each sector such that the share of firms above this threshold is the same as reported in the SAFE survey.

Firm by firm we can now assign an indicator $ICC_i = 1$ if the estimated SAFE score index is above the threshold we obtained from the before mentioned exercise.

Chart 15 shows the share of credit constrained firms for selected European countries by percentile of labour productivity before, during and after the crisis.

Chart 15

Share of credit constrained firms by percentile of labour productivity



Source: CompNet, 20E sample.

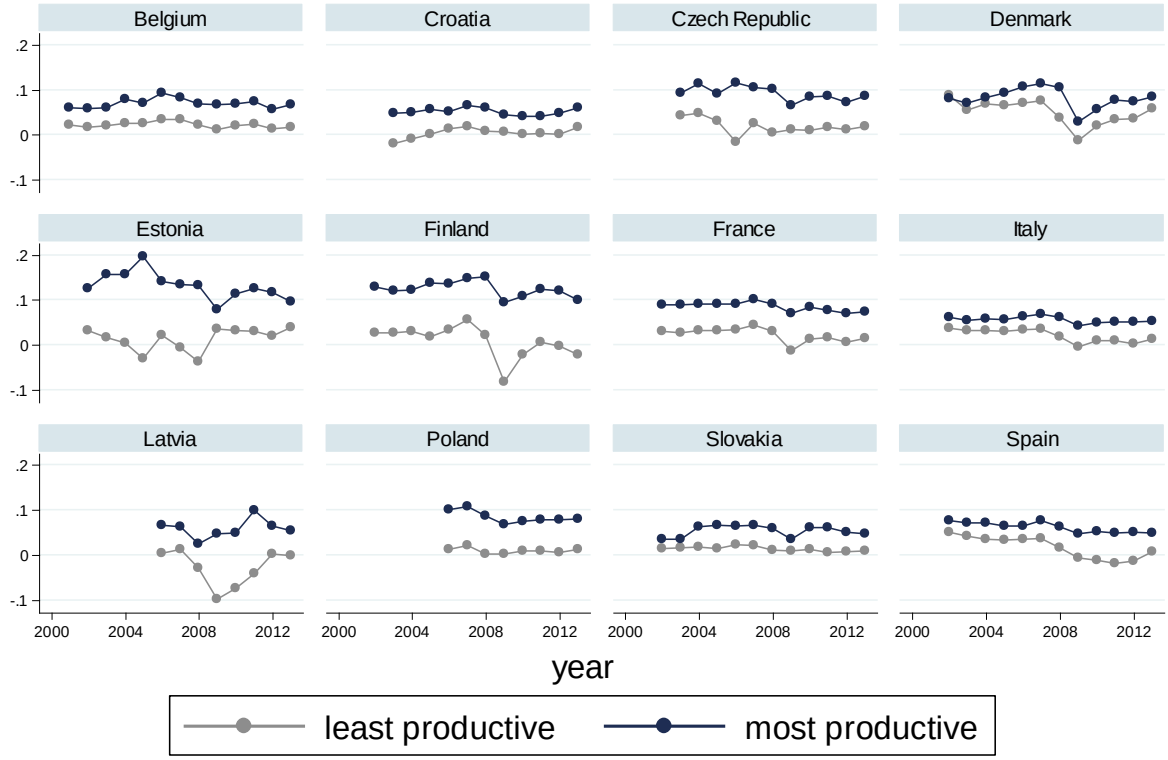
Several things can be observed. First, access to credit in 2013 has improved in most countries compared to the situation before and during the crisis. The change was particularly pronounced for the least productive firms which have been hit most by the credit crunch in 2008/9, especially in Denmark and Finland. On the contrary, the most productive firms appear to be less affected by the crisis and seem substantially less credit constrained in general.

6.2 Return on assets and investment profitability

The return on assets is an important way to measure the overall profitability of firms as it connects the level of earnings with the invested capital. Chart 16 depicts the return on assets for several European countries for the top (p90) and the lowest (p10) percentile of the labour productivity distribution.

Chart 16

Firms' return on assets by labour productivity



Source: CompNet, 20E sample.

Overall the level of profitability is very heterogeneous. The return on investments is considerably low in Italy and Spain while higher in countries like Estonia and Finland, both before and after the crisis. The difference is, however, less pronounced for the least productive firms. During the crisis the return on assets fell significantly for all firms, given the sharp profit contraction. Interestingly, while the index recovers quickly in some countries, firms operating in stressed markets still suffer from low returns, as it can be seen in Spain and Italy for example.

Low profitability of investments might have been an important reason for the prolonged impact of the recent crisis. With respect to the situation in 2013, we can see from Chart 16 that profitability is on a slight upward trend. It must be noted however, that the return on assets varies to a significant extent across industries (typically depending on the industry's capital intensity). Hence, some compositional effects could potentially drive the results.

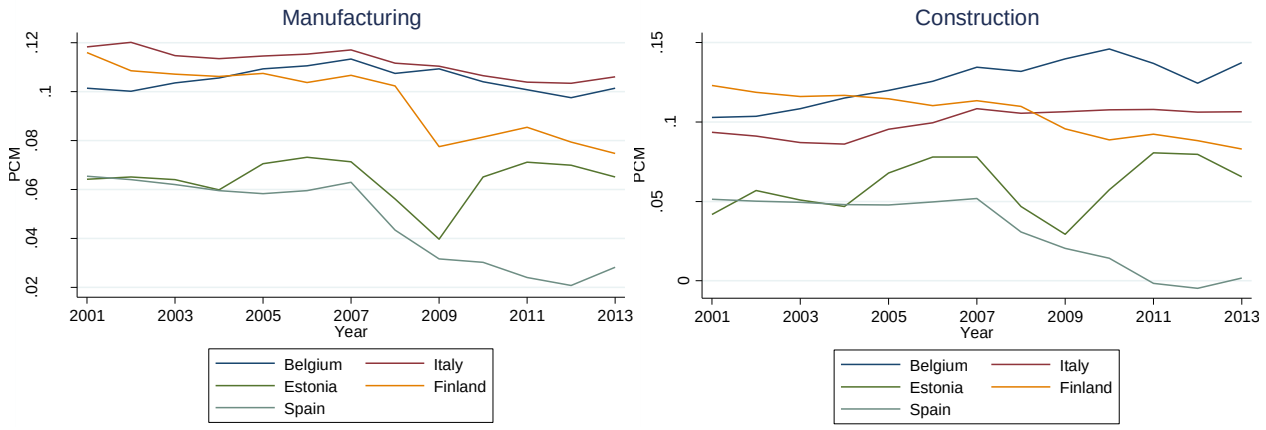
7 Mark-up module

7.1 Firms' price-cost margin

The mark-up module of the database consists of key indicators to assess the degree of market competition as well as market concentration, e.g. the price-cost margin (PCM) and the Herfindahl-Hirschman index (HHI). The PCM quantifies the mark-up that firms are able extract from their customers. An important theoretical feature of this measure is that the higher the market competition, the smaller should be the price cost margin (PCM). In fact, in absence of barriers to entry, prices should be equal to the marginal costs. Positive and persistent price-cost margins typically suggest that firms have at least a certain degree of market power.

Chart 17

Evolution of the price-cost margin in the manufacturing and the construction macro-sector



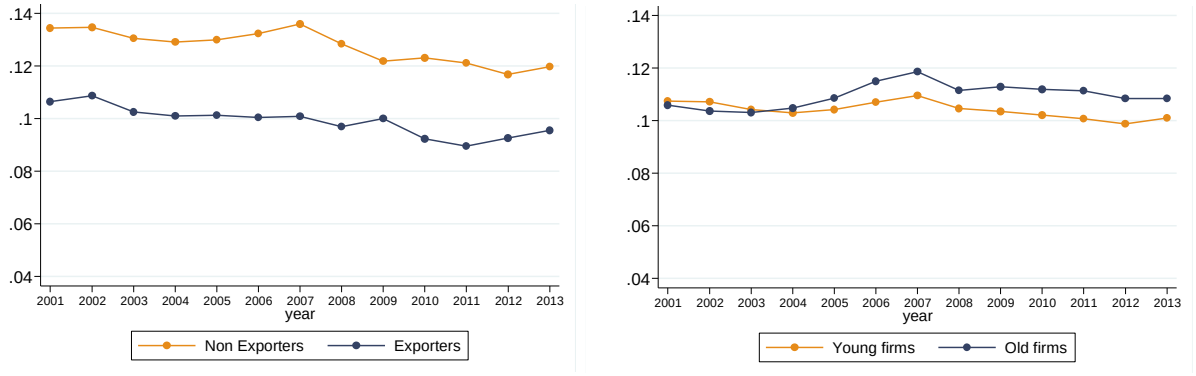
Source: CompNet, full sample.

Chart 17 highlights some interesting facts on the evolution of the PCM in the manufacturing and the construction macro-sector. Firstly, the PCM seems to be on a slight but gradual downward trend in the manufacturing sector. This might be due to the fact that firms can easily enter the market, which increases competition and drives prices down. It could also be the result of the Great Recession in 2008/9, with firms cutting prices to counteract declining demand. Secondly, considering the situation in Spain for both industries, we can notice that the price-cost margin is slightly increasing – which is in contrast to the trend for the previous five years.

In order to fully account for the large degree of firm heterogeneity, it is necessary to extend the analysis in order to fully account for firms' heterogeneity. Particularly, we want to assess whether there can be differences between exporters and non-exporters.

Chart 18

Evolution of the price-cost margin in Italy by firm characteristics: exporter status (left panel) and age (right panel)

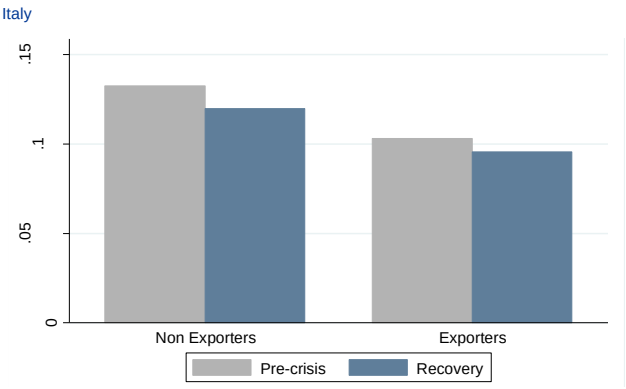


Source: CompNet, full sample.

Chart 18 shows that a difference in PCM between exporters and non-exporters exists and is economically relevant. This result might be due to the fact that exporting firms are exposed to a larger degree of competitive pressure which leads to lower prices. Dividing firms into young and old, the difference is insignificant. It is interesting to note, however, that established firms are setting higher mark-ups on average. This result is consistent with the economic intuition: established firms can be expected to be more experienced in the production process and have lower marginal cost. However, it is possible also to advance that mature markets are often populated by ageing firms that have stable market shares and face low threats from entry, therefore being able to extract higher surpluses from customers.

Chart 19

Price-cost margin by firms' export status



Source: CompNet, full sample; the label 'Pre-crisis' corresponds to the years before 2008 and 'Recovery' corresponds to the year 2013.

It is interesting to assess these dynamics in countries that have been hit by the recent crisis setting. Chart 19 depicts the evolution of PCM before and after the crisis for the case of Italy. It can be seen that firms have a lower PCM in 2013 compared to the situation before the crisis. This is true for both exporters and non-exporters. The difference is, however, more pronounced for non-exporting firms.

8 Resource allocation and productivity

In a frictionless economy, resources like capital and labour would be allocated in the optimal manner – i.e. they would flow to those firms with the highest productivity. This is because returns on capital and labour would be highest for the most productive firms. In real economies, however, resources may not be allocated in this way because of market frictions. Some of these frictions are related to preferences and technology and are thus beyond the direct reach of policy. Other frictions may be policy-induced distortions and could therefore be reduced through institutional or regulatory changes. Recent research results strongly suggest that improved resource allocation has important implications for aggregate productivity and overall economic growth. Moreover, analysing cross-country competitiveness indicators built from firm-level data shows that cross-country productivity differences are to a large extend due to differences in allocative efficiency of resources.

8.1 The OP gap

The CompNet database offers several important measures of allocative efficiency. Among them the OP gap refers to the extent to which, in the cross-section, firms with higher than average productivity have a larger than average size in the sector. The concept of static allocative efficiency provides a snapshot of how resources are allocated at a certain moment in time by measuring the covariance between firms' size and labour productivity. A low covariance indicates that aggregate productivity can improve by moving resources towards the most productive firms. A more technical discussion of the OP gap can be found in Box 6.

Box 6

OP gap: technical background

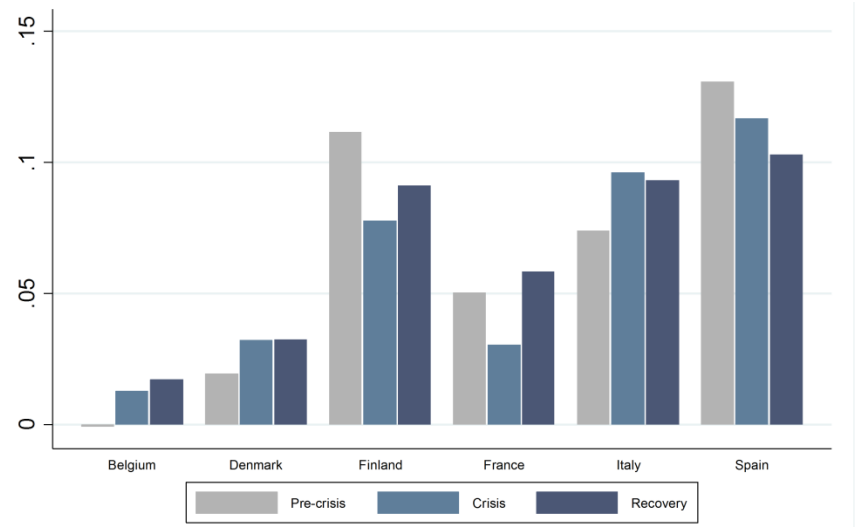
Olley and Pakes (1996) measure the degree of allocative efficiency by decomposing an index of industry-level productivity into an unweighted average of the labour productivity of all firms in the industry and a covariance term between relative labour productivity and the relative size of the firm. The covariance term reflects the contribution to an industry's productivity resulting from a more efficient allocation of resources across firms operating in that industry relative to a situation in which resources are allocated randomly. Specifically:

$$y_{st} = \sum_{i \in S} \theta_{it} \omega_{it} = \bar{\omega}_{st} + \sum_{i \in S} (\theta_{it} - \bar{\theta}_{st})(\omega_{it} - \bar{\omega}_{st}),$$

where y_{st} is the weighted average productivity of sector *s* at time *t*, *S* is the set of firms in industry *s*, θ_{it} and ω_{it} represent the size and productivity of firm *i* at time *t*, $\bar{\theta}_{st}$ and $\bar{\omega}_{st}$ represent the unweighted mean size and productivity of industry *s* at time *t*.

Chart 20

Evolution of OP gap for core European countries before, during and after the crisis

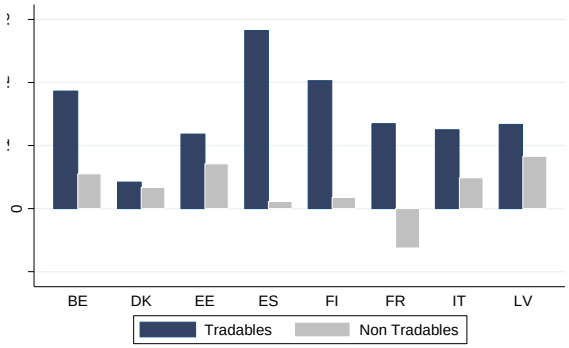


Source: CompNet, 20E. Notes: the label 'Pre-crisis' corresponds to the years before 2008, 'Crisis' corresponds to the time from 2008 to 2012 and 'Recovery' corresponds to the year 2013.

Chart 20 shows the dynamics of the OP gap for several European countries for the periods before, during and after the recent crisis. As the metric suggests, labour resources appear to be more efficiently allocated towards the most productive firms. Very pronounced improvements can be seen in Belgium, Finland and France. Countries differ, however, by the extent the OP gap dropped during the crisis, i.e. the allocation worsened. A substantial worsening of allocative efficiency can be observed for Finland, France and Spain while the OP Gap was improving in Denmark and Italy. The situation in Spain appears to be an exception from the general trend: while allocative efficiency in all countries is better than before the outbreak of the crisis in 2008, the OP gap in Spain is further declining.

Chart 21

OP gap for tradable and non-tradable sectors



Source: CompNet, 20E sample.

Chart 21 on the left presents the same indicator, while distinguishing between tradable and non-tradable sectors, for the years between 2009 and 2013. The sector classification roughly corresponds to the manufacturing and service macro-sector. As it can be seen, there are pronounced within-country differences with respect to the degree of allocative efficiency. In fact, allocative efficiency is higher in the tradable sectors for all countries. The within-country difference is particularly striking for Belgium, Spain and Finland. This result might reflect the hesitant regulatory reforms in the non-tradable sectors, especially in mature European countries, making these sectors more sheltered from competition.

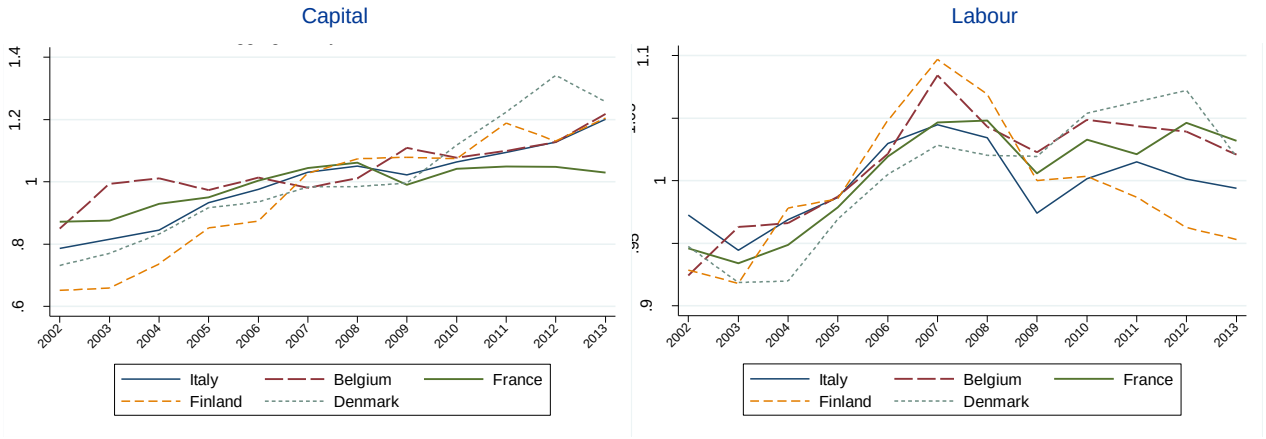
8.2 Alternative measures of allocative efficiency

Hsieh and Klenow (2009) develop a theoretical framework where production inputs are allocated across heterogeneous firms operating in a given sector. Under some restrictive assumptions, such as constant elasticity of substitution and perfect competition, in narrowly defined sectors, they assume that the marginal cost of labour and capital are equal for all firms operating in that market. If markets are efficient, this would imply that the marginal productivity of labour and capital should also be equalized across all firms. If this is not the case, it is due to market distortions. On the basis of this result, the authors propose to measure resource misallocation with the within-sector dispersion of marginal productivity of capital and labour. These indicators of resource misallocation are also included in the CompNet database.

Chart 22

Dispersion of marginal revenue productivity of capital and labour

Manufacturing macro-sector; aggregated by value added



Source: CompNet, full sample.

Chart 22 depicts these indicators for five countries. It shows the evolution of dispersion of marginal productivity of capital (left panel) and of labour (right panel) over time, suggesting that misallocation of capital increased over time in all countries, particularly in Finland. The within-sector dispersion of the marginal productivity of labour displays a similar trend before but has declined substantially for all countries during the crisis, and is stable since then. Indeed, the data from 2013 point towards an improvement in the allocation of labour in all five countries as suggested by a decline in the dispersion of marginal labour productivity, especially in Denmark.

9 Conclusions

The CompNet firm-level database aims at filling a gap in the collection of firm-level data in the European Union. While it is widely recognised that taking into account firms' heterogeneity is crucial to avoid aggregation bias and properly assess aggregate performance and, most notably, competitiveness, existing firm-level databases are still inadequate. They tend to be biased towards the largest firms, and they are limited in terms of cross country comparability. Solving these issues is a major objective of CompNet. The improvements which we have achieved on that score over the last vintages of the database are in this sense extremely encouraging.

Turning to the actual findings presented in this report, it is important to underline that they represent just a snapshot of a multitude of indicators potentially available to policy makers and researchers. From the new data presented it would appear that significant signals of recovery have emerged in 2013. In particular, firms' access to capital has improved substantially. Compared to the situation in 2010, i.e. at the peak of the crisis, more firms are growing and at a faster pace. Also, there are indications that resource reallocation may have been improving, including less binding financial constraints particularly for high productive firms.

However, it remains a challenge to identify the causal links that are driving the actual recovery process. This is why CompNet members consider critical to further improve and enlarge the database aiming to provide policy makers with even more robust analytical tools.

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Competitiveness Research Network

The Competitiveness Research Network (CompNet) was created in March 2012 within the EU system of Central Banks to "Provide robust theoretical and empirical link between drivers of competitiveness and macroeconomic performance for research and policy analysis", using a multi-dimensional approach – involving macro, firm-level and cross-border analysis. CompNet has developed substantial reputation in the academic and policy community over the last five years. Output includes more than 50 working papers, 10 journal articles, one e-book, several policy notes, as well as 2 major databases – one macro and another one firm level-based. This report draws from the 5th vintage of the novel firm-level micro-aggregated database (13 EU countries) that aims at setting up a new research infrastructure to overcome confidentiality and comparability issues of balance-sheet information of European firms and taking into account the link between their productivity and trade/financial/labour/regulation conditions.

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