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profitability versus cost and price indicators

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# **PATTERNS OF CONVERGENCE (DIVERGENCE) IN THE EURO AREA: PROFITABILITY VERSUS COST AND PRICE INDICATORS**

by Monica Amici\*, Emmanuele Bobbio\* and Roberto Torrini\*

## **Abstract**

We analyse patterns of convergence (divergence) across euro-area countries in manufacturing since monetary union and find that not only costs, but also profitability have followed divergent paths. We further find that profitability developments only partially overlap with those of unit labour costs and producer prices, more extensively studied in the literature. Considering the largest countries, profitability in manufacturing in Germany and Spain has risen by comparison with non-tradables and with respect to France and Italy, where profit margins in manufacturing have declined and have lost ground with respect to the non-tradable sector. We show that these developments are correlated to the relative export performance of these countries. This correlation also holds in a two digit sector-level panel analysis, comprising all the euro-area countries that first entered the monetary union. This is consistent with the recent international trade literature, according to which successful exporting firms, which are more efficient or produce better products, also charge higher mark-ups. Turning to Italy, after a protracted decline both export shares and profit margins in manufacturing have improved in recent years, which is consistent with a recovery in external competitiveness.

**JEL Classification:** D33, D4, J3, L1, F10.

**Keywords:** euro area, profit shares, profit margins, export shares, unit labour costs.

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## 1. Introduction<sup>1</sup>

A divergence in labour cost and price developments associated with trade and current account imbalances in a monetary union should be temporary and self-correcting. However, the financial and sovereign debt crisis has made clear that capital flows can feed growing imbalances for a long time and that the ensuing adjustment may be costly and lengthy, especially if coordination instruments between national policies are weak – Schmitt-Grohe and Uribe (2016). These concerns justify the monitoring process embedded in the Country Imbalance Procedure of the European Union Commission focusing, among other macroeconomic indicators, on current account positions of member countries and unit labour costs (ULC) as the main indicators of external competitiveness. However, various authors have documented the difficulty in linking trade imbalances and export performance of euro area member states to the development of standard measures of cost/price competitiveness (e.g. European Central Bank, 2012, Estrada, Gali, Lopez-Salido 2013). Many contributions have invoked the role of non-price competitiveness, based on product quality and product differentiation, to explain the discrepancies between expected performance as forecasted based solely on price/cost developments and actual export performance (Carlin, Glyn and Van Reenen, 2001, Benkovskis and Wörz, 2014, Bayoumi, Harmsen and Turunen, 2011, Bricongne, Fontagne, Gaulier, Taglioni and Vicard, 2011, Di Mauro and Forster, 2008; Giordano and Zollino, 2016).

We argue that profit margins, jointly with standard competitiveness measures, may help to better assess the sustainability – in terms of external competitiveness – of the relative dynamics of prices and costs. If markets are not perfectly competitive, costs and prices are generally not sufficient statistics to assess countries' competitiveness, when considered in isolation from one another. Other things equal, higher non-price competitiveness will be revealed by higher margins, because of the ability of more efficient firms or firms offering better products to charge higher mark-ups relative to their competitors. On the other hand, higher costs and prices may be positively associated with firms competitiveness if they reflect better product quality. Thus, the evolution of mark-ups and profit margins should be analysed together with that of costs or prices when assessing a firm ability to compete on international markets, because it reflects the ability of the firm to pass cost increases on to the consumer – due to lower demand elasticity – and to respond to increased competition – e.g. the emergence of new competitor due to the integration of global markets. The link between profit margins and export performance find both empirical and theoretical justification in recent international trade literature. De Loecker

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<sup>1</sup> We thank Matteo Bugamelli and Paolo Sestito for their comments. The views expressed herein are those of the authors and do not necessarily reflect the views of the Bank of Italy.

and Warzynski (2012) provide evidence that exporting firms are able to charge higher mark-ups, as predicted by models of trade with heterogeneous firms and variable demand elasticity (e.g. Melitz and Ottaviano 2008) and that these higher mark-ups are not completely explained by standard measures of TFP.

The recent literature on factor shares has extensively analysed the rising trend in the profit share of value added. For the US, a number of papers have pointed at rising mark-ups, along with a rise in concentration of production in more profitable firms, as a possible explanation for this trend (Barkai, 2016, De Loecker and Eeckhout, 2017, Autor, Dorn, Katz and Patterson 2017). These developments are not homogeneous across countries, but little attention has been devoted to analyse geographical heterogeneity in firms profitability developments and the impact that diverging profitability trends may have on countries economic performance. However, profitability differentials may be an important driver of resource reallocation from “less profitable” regions or countries to “more profitable” ones and may signal relevant geographical differences in firms performance and competitiveness. This is of particular importance within the euro area, where exchange rate adjustments cannot help undo structural imbalances and income redistribution across member countries can only partially mitigate the long-run impact of structural imbalances.

In this paper, we focus on aggregate country-sector profit margins developments within the euro area and relate these patterns to the literature on price-cost imbalances and competitiveness of euro area member countries. We first analyse the development of unit labour costs and different measures of prices and margins in the Euro Area, focusing on manufacturing and the 10 countries that adopted the euro between 1999 and 2001 (EA10).<sup>2</sup> We document that euro area countries have followed different patterns: profitability in the tradable sector (manufacturing) have diverged and have not necessarily followed the same pattern as unit labour costs, showing that profit margins development may actually add information in the assessment of euro area countries’ competitiveness. Then, we show that the export performance across these countries is better understood when considering ULC (or prices) and margins in conjunction, and that considering only ULC (or prices) may be actually misleading. Finally, we corroborate our argument and descriptive evidence by estimating an export share equation on a panel of 12 manufacturing sectors over 2000-2014 across EA10 countries, showing that there is a positive relation between profit margins and export performance.

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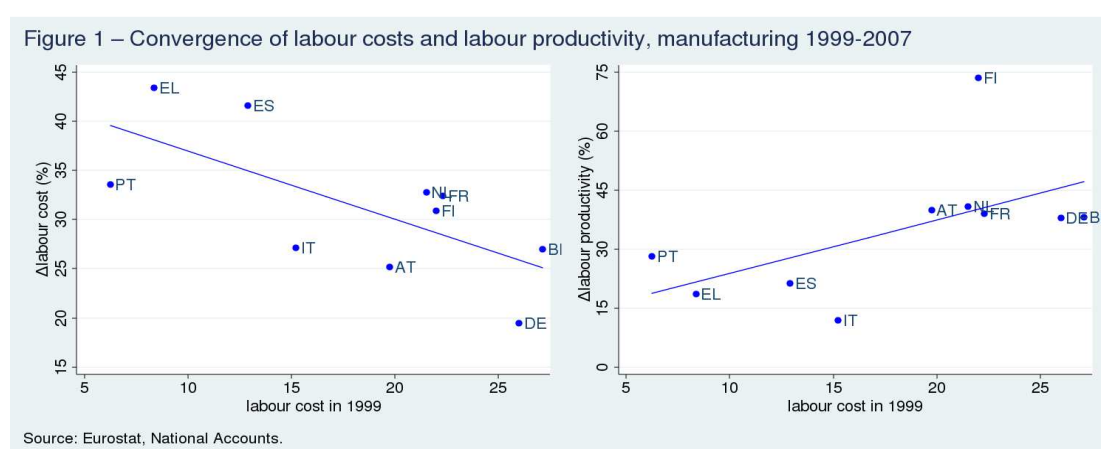
<sup>2</sup> We exclude Luxemburg, for lack of comparable data, and Ireland, for data issues related to the activity of multinational corporations (FitzGerlad, 2016).



## 2. Nominal convergence, real divergence and export performance in the euro area

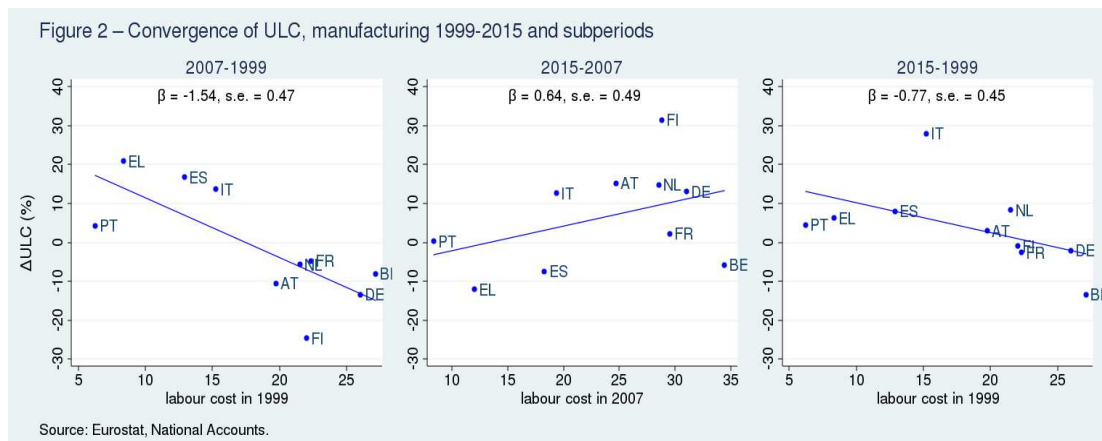
In this section, we describe the development of labour cost, productivity and unit labour cost (ULC) and production prices (PPI) in euro area countries since the monetary union using data from Eurostat National Accounts (SEC 2010). We focus on manufacturing, because it is the portion of the economy more exposed to international competition.

Figure 1 displays the growth rates of labour cost per hour worked (left panel) and of labour productivity (right panel) in manufacturing across EA10 countries between 1999 and 2007 against the initial level of the labour cost per hour worked in 1999.

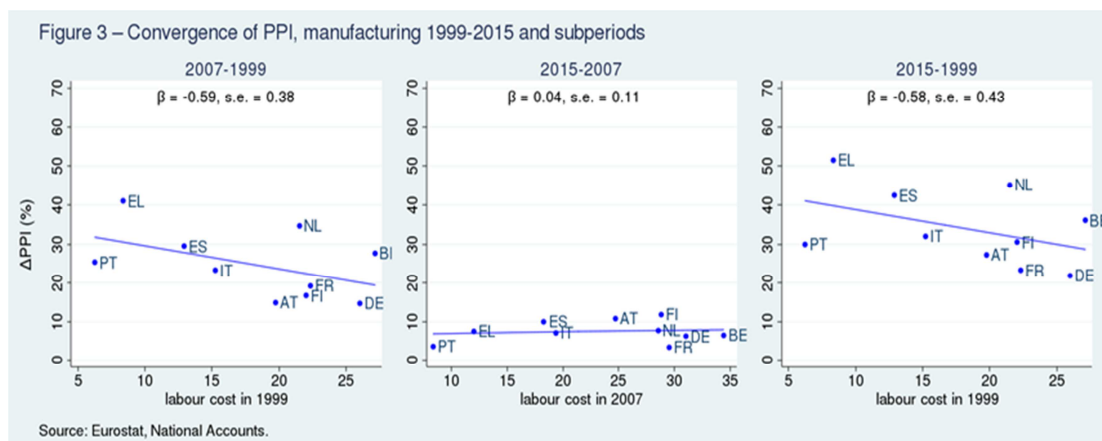


The figure shows that labour costs converged across EA10 countries since the inception of the monetary union and up to the onset of the great recession; however, productivity did not. Indeed, productivity grew more in countries with higher initial labour costs (and productivity) levels; as a result, unit labour costs (defined as the hourly labour cost divided by hourly labour productivity, ULC) diverged significantly – Figure 2, left panel. Similar patterns hold when considering the whole private sector – not reported. The lack of convergence in productivity in the tradable sector suggests that the faster dynamics of average wages in lower-income euro-area countries cannot be explained by a Balassa-Samuelson effect resulting from catching up.<sup>3</sup>

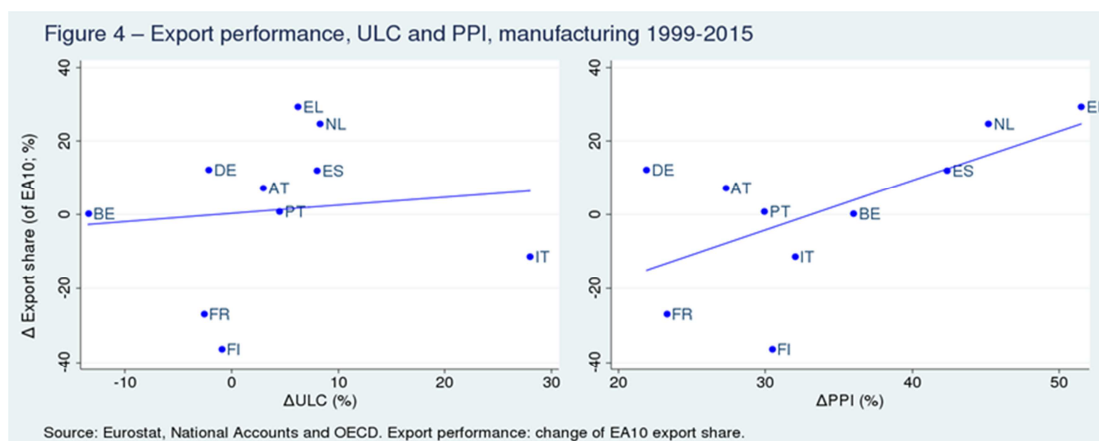
<sup>3</sup> The Balassa-Samuelson effect predicts that catching up economies experiencing convergence in productivity should display rising average unit labour costs (wages rising faster than productivity) relative to high-income countries. The catching up of productivity in the tradable sector would spur a rise of wages in the tradable sector and this should spill over into the non-tradable sector where productivity tends to rise at a slower pace, causing a rise in average unit labour cost. In the tradable sector – where the law of one price is supposed to hold – wages should grow at the same rate as productivity leaving ULC unchanged.



Since the onset of the financial crisis, this pattern has been partially reversed, due to the asymmetric impact of the two crises, in particular of the sovereign debt crisis – Figure 2, middle panel. However, taking the entire period 1999-2015, substantial differences in ULC developments persist, suggesting a relative loss of international competitiveness in low wage (low income) economies vis-à-vis high wage (income) economies – right panel.



Production prices (PPI) have followed similar patterns, though not identical. Figure 3 displays the change of PPI in manufacturing across EA10 countries against the initial level of labour costs for the periods before and after the crisis, and for the two periods combined. The pattern of convergence before the great recession is weaker, as one would expect given the more direct pressure of international competition towards price equalization – compare left panels of Figures 1 and 3. During the crisis price dynamics declined substantially, reducing PPI inflation dispersion across these countries – middle panel. However, when looking at the entire period a similar pattern for PPIs and ULCs emerges, with some notable differences: Italy, where the price increase was comparatively smaller, and Greece, the Netherlands and Belgium, where it was comparatively larger.



Finally, we turn to export performance – which we regard as a measure of revealed external competitiveness – using data for manufacturing export at current prices from the OECD. Figure 4 displays for each country the percentage change of the export share, relative to total EA10 countries’ export, against the percentage change of ULC (left panel) and PPI (right panel) in manufacturing between 1999 and 2015. Over this period, export grew relatively more in Germany, Spain, the Netherlands and, since 2011, in Greece; instead, the export share declined in Italy and even more so in France and Finland – where technological change disrupted the telecommunication industry.

No obvious negative association between export shares and ULC and prices emerges at this level of aggregation. In fact, export did increase more in Germany and Austria, where price and cost dynamics was relatively weaker, but also in Spain, the Netherlands and Greece, where it was stronger. Moreover, the export share declined not only in Italy, where ULC (although not so much PPI) grew relatively more, but also in France and Finland, where ULC and PPI developments were very weak. This makes quite clear that the relationship between relative cost-price dynamics and the relative performance on international markets of euro-area countries is far from obvious.

A way to reconcile the patterns displayed in Figure 4 is to account for the fact that if firms have market power, then the price set by the firm is the outcome of an optimal decision reflecting cost and competitive pressures, as well as the ability of firms to overcome these pressures by innovating and diversifying their products. Several authors have dubbed this ability to compete, not fully accounted for by price developments, as non-price competitiveness (Carlin et al., 2001, Benkovskis and Wörz, 2014, Bayoumi et al. 2011, Bricongne et al. 2011, Di Mauro and Forster, 2008; Giordano, Zollino, 2016).

Faced with rising competition, producers in a particular country may compress their margins and reduce their prices in an attempt to preserve their market share (this is possibly the case for France, Finland and Italy – as we argue in the next section). On the other hand, they may be able to innovate and differentiate their products and increase their market

share, while raising margins and prices at the same time – and possibly their costs if some rent sharing takes place or if more inputs are required to produce new varieties. Thus, the relationship between costs, margins and prices developments may be – and in fact is as we document below – nontrivial.

The correlation between export performance and profit margins finds a clear justification in the recent international trade literature, where firms self-select into export markets based on their higher efficiency and better product quality, which in turn shows up in higher mark-ups. As predicted by theoretical work – e.g. Melitz and Ottaviano (2008) – De Loecker and Warzynski (2012) find evidence that exporting firms are able to charge higher mark-ups on marginal cost and that higher mark-ups are not completely explained by firm efficiency, as measured by total factor productivity. Going from the micro to the macro level, as far as a country export share is explained by the number of exporting firms and their ability to compete in foreign markets – because of either higher technical efficiency or better product quality – profitability in the tradable sector can be viewed as a complementary indicator to be taken in conjunction with costs or prices to assess countries' competitiveness. For instance, Obstfeld (2009) conjectures that the deterioration of the terms-of-trade observed in Japan between 1988 and 2007 was due to a reduction of mark-ups of Japanese exporting firms, associated with a decline in their world export share.

Although at the aggregate level we can only measure average profitability across both exporting and non-exporting firms, this source of mismeasurement can be less of a concern if exporters and non-exporters profitability tend to move together. In fact, De Blas and Russ (2015) argue that mark-ups of exporting and non-exporting firms actually co-move, the rationale being that exporting firms are the most efficient and whatever external (or internal) force drives their margins down or up it will also affect the margins of less efficient, non-exporting ones.

### **3. Profit margins evolution in euro area countries**

In this section we describe the evolution of profit margins across the euro area, showing that, at the aggregate level, they have actually followed quite different patterns.

It is useful to recall that under the assumption of constant returns to scale the marginal cost equals the average cost and the mark-up can be written as the ratio between revenues and total costs. Profit margins, the ratio of profits to revenues  $\pi$ , and the mark-up,  $\mu$ , are then related to one another by the following relationship:

$$\pi = 1 - \frac{1}{\mu} \tag{1}$$

If labour is the only factor of production, profit margins are simply the profit share of value added, namely the complement of the labour share,  $1 - \omega$ , where:

$$\omega = \frac{w \times HT}{D \times Y} \quad (2)$$

$w$  is the cost per hour worked,  $HT$  is total hours worked,  $D$  is the implicit value added deflator,  $Y$  is value added at factor cost. If production requires capital, then the gross profit share will also include the cost of capital, but it will move together with profit margins to the extent that the capital and labour cost shares of total costs remain constant over time. This is the case with a Cobb-Douglas technology, if technological parameters remain unchanged. As a first approximation, we first describe the evolution of gross profit shares across EA10 countries, and then we analyse the evolution of the profit share net of capital cost as a more precise measure of aggregate profit margins.

While the gross profit share has generally been increasing in most countries since the early 1980s, there are substantial country and industry level differences (IMF, 2017). Also, in recent years this pattern has shown signs of a reversal in several countries (Torrini, 2015, for Italy and Berger and Wolff, 2017, for the largest euro area countries). Figure 5 displays the percentage change of the profit share between 1999 and 2007 and between 1999 and 2016 across EA10 countries for the whole economy (top-left panel), the business sector (top-right) and the manufacturing sector (bottom-left).

The profit share for the whole economy includes real estate rents, whose incidence on total value added largely reflects the developments of the relative price of housing services (rents). Most of these rents are imputed rents to households living in their own house and are affected by movements in housing prices, although the price-to-rent ratio shows substantial variability, over time and across countries. In any case, real estate rents are quite independent of the way in which value added is shared between profits and wages in the business sector.<sup>4</sup> The share of housing rents on total value added has increased significantly in most euro area countries, with the notable exception of Germany, Belgium and The Netherlands, explaining part of the rise of the profit share at the aggregate level in a number of countries – Figure 5, bottom-right panel.<sup>5</sup> Net of real estate, the profit share in the business sector has remained fairly constant on average, with marked cross country differences and large swings before and after the crisis. Looking at the largest euro area economies, it has remained stable in Spain, it has increased in Germany, and it has declined in Italy and France.<sup>6</sup>

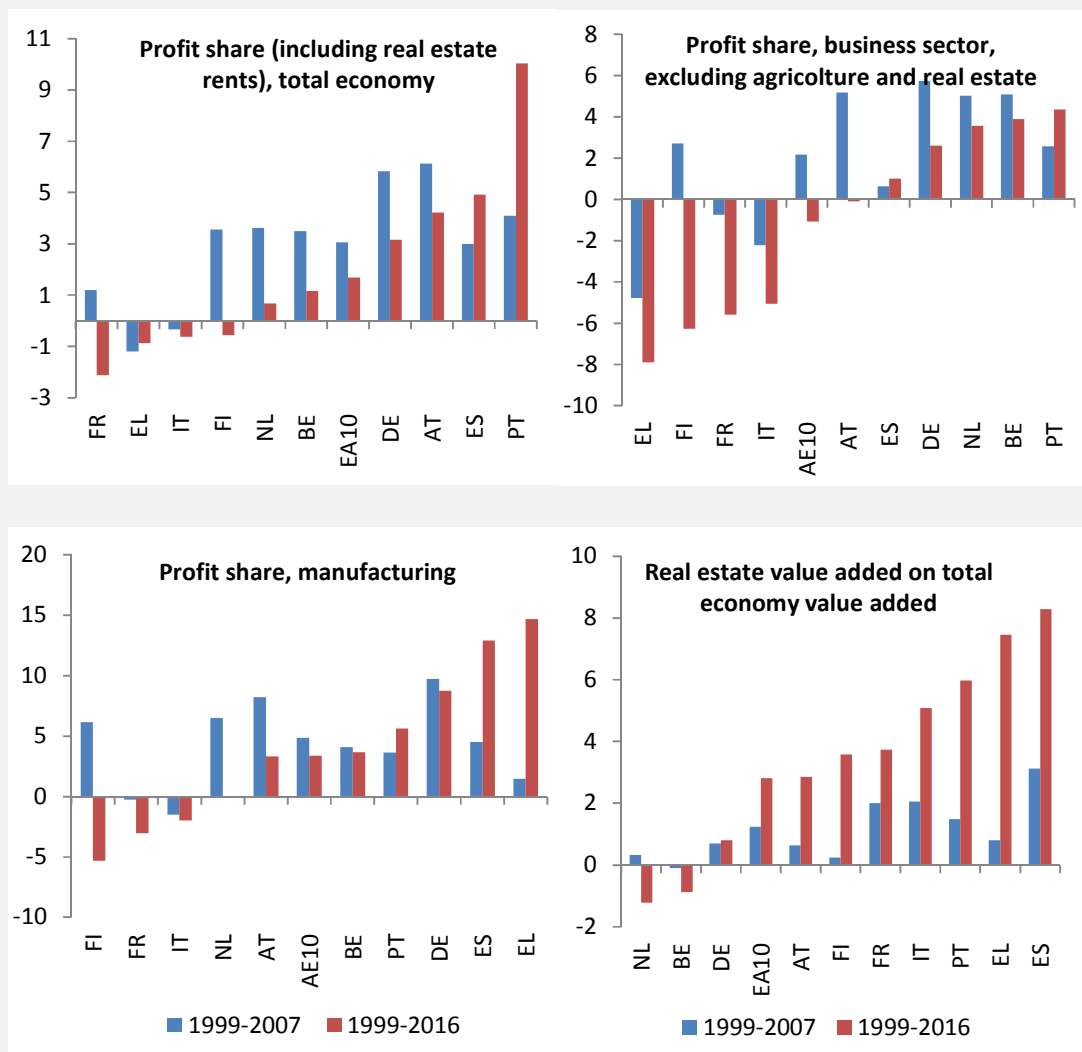
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<sup>4</sup> Considering the whole economy, the aggregate profit share is also affected by the share of public services, where the net return to capital is zero by construction. In principle, changes in the incidence of the public sector can also affect the dynamics of the profit share, but this is not as relevant as real estate rents in explaining factor shares movements over a relatively short period of time, as the one we consider here.

<sup>5</sup> See Rognlie, (2015) and Torrini, (2016) for an analysis of the impact of housing rents on aggregate profit shares for the Us and Italy respectively.

<sup>6</sup> A more thorough analysis using fixed effect regressions shows that these patterns do not reflect differences in the industry composition of value added – not reported.

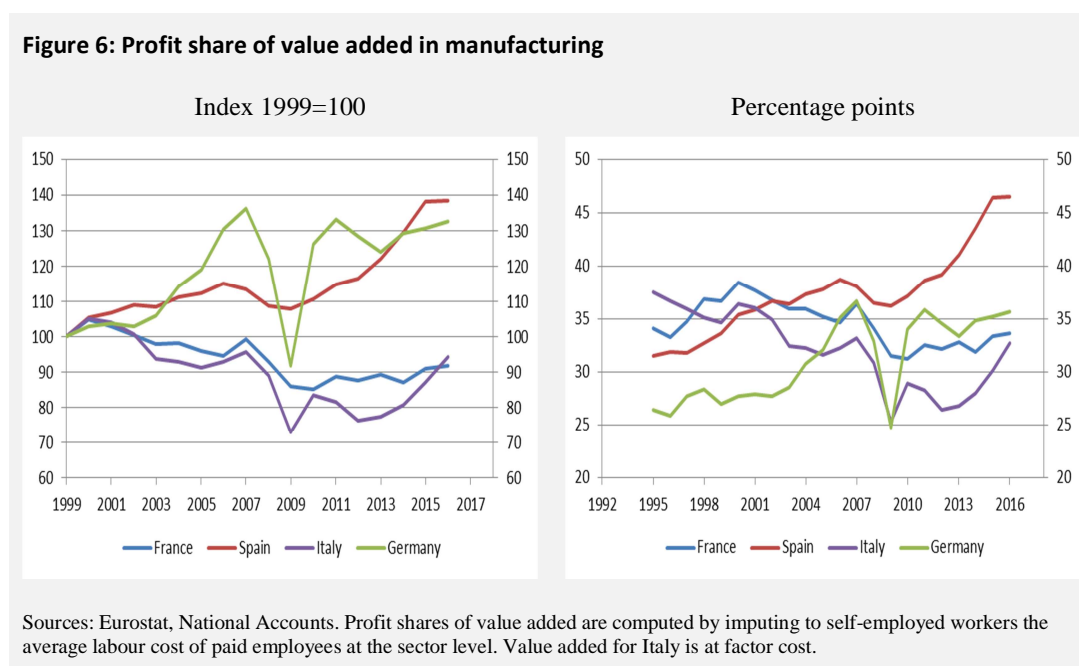
Figure 5: Profit share, various aggregates (percentage point change 1999-2007 and 1999-2016)



Sources: Eurostat, National Accounts. Profit shares of value added are computed by imputing to self-employed workers the average labour cost of paid employees at the sector level. Value added for Italy is at factor cost

In manufacturing, which is our sector of interest, although increasing at the EA10 level, the profit share of value added displays markedly different developments across different member states. Considering the largest economies, the profit share has significantly risen in Spain and Germany after 1999, and it has declined in France and Italy (Figure 6, left panel). The profit share in the former two countries was lower than in the latter two in 1999 (right panel), but convergence can only partially explain these patterns, as the profit share in Spain and Germany actually surpassed that in Italy and France over the period under consideration; moreover, differences in levels should not be

overemphasized, considering the fact that levels, more than dynamics, suffer from measurement problems<sup>7</sup>.



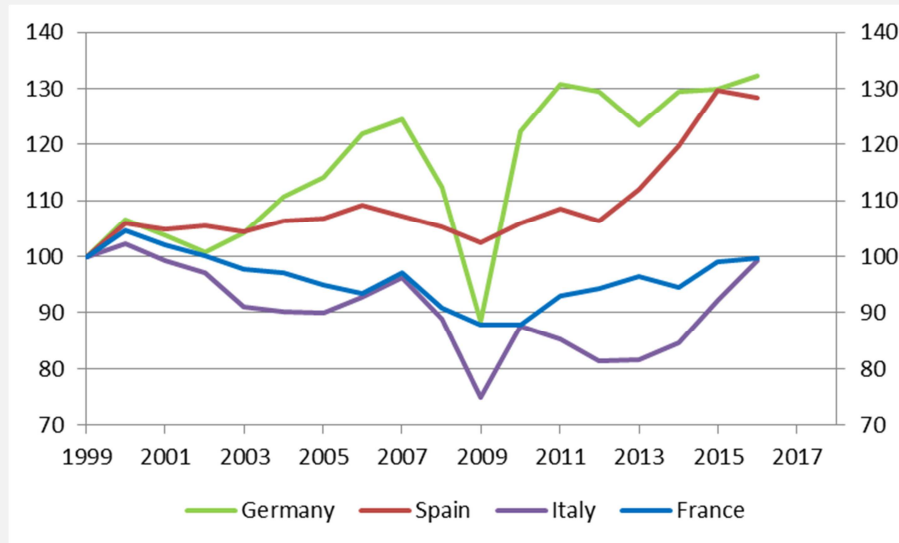
Considering the most recent years, in Italy, where the profit share had steadily declined, profitability has improved, returning to levels comparable to those of the mid-2000s. The recovery has been less marked in France.

Figure 7 shows that profitability in the Spanish and German manufacturing sector also improved with respect to non-tradable sectors,<sup>8</sup> while in France and in Italy it declined relative non-tradable sectors as well. In other words, these contrasting developments (Germany and Spain on one side, France and Italy on the other) are especially evident in the more integrated manufacturing sector, rather than in the more insulated rest of the economy. In more recent years, both in France and (more so) in Italy, profitability in manufacturing has improved with respect to the non-tradable sectors. However, considering the entire period, Germany and Spain show a better relative performance of manufacturing, possibly suggesting a gain in the competitiveness of their exports.

<sup>7</sup> For instance, differences in levels are affected by the way in which self-employment income is accounted for or by structural differences in capital intensity.

<sup>8</sup> We include the construction sector and business services among the non-tradable sectors.

**Figure 7 – Profit share in manufacturing on profit share in non-tradable sectors net of real estate (index 1999=100)**



Source: Eurostat, National Accounts. Profit shares of value added are computed by imputing to self-employed workers the average labour cost of paid employees at the sector level. Value added for Italy is at factor cost. Non-tradable defined as the sum of construction sector and business services.

We can relate gross profits to price and ULC developments, recalling that ULC can be expressed as the labour share times the value added deflator.<sup>9</sup> Taking logs and using the fact that  $\ln(1 - x) \approx -\ln(x)$ :

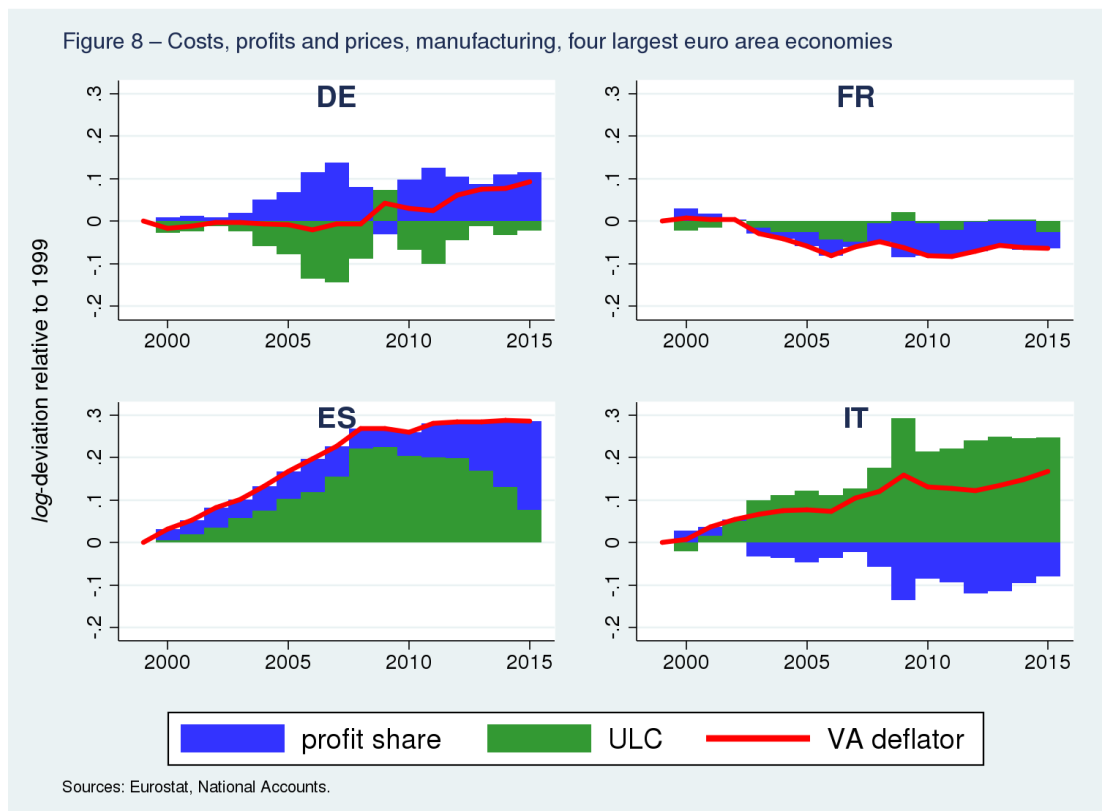
$$\ln(\pi) \approx -\ln(\omega) = \ln(D) - \ln(ULC) \quad (3)$$

This decomposition is displayed in Figure 8, where we plot the log-deviation of the ULC, of the value added deflator and of the profit share relative to 1999 in manufacturing for the four the largest euro area countries.

<sup>9</sup> If prices of factors other than labour follow a common trend across different countries, then movements of the value added deflator mimic those of PPI and the identity above can be loosely interpreted as relating our three measures of competitiveness: costs, margins and prices.



Figure 8 – Costs, profits and prices, manufacturing, four largest euro area economies



Sources: Eurostat, National Accounts.

In Germany, in the face of a stable deflator, the ULC declined very rapidly between 2002 and 2007, as a result of wage compression. The profit share increased correspondingly. In the aftermath of the financial crisis, the ULC has recovered due to the rise of the deflator, while the profit share has not changed much. Overall, Germany is characterized by an increasing profit share and moderate cost and price developments. In France, the ULC has followed a similar pattern, though with less pronounced swings. However, this development was the result of a declining deflator, especially in the years before the crisis, and a declining profit share. Spain and Italy represent two parallel and polar cases with respect to Germany and France. In both countries, the ULC increased before the crisis, as a result of wages rising faster than productivity. However, in Spain, the deflator rose even more, increasing the profit share, whereas in Italy the deflator lagged the ULC, compressing the profit share. Following the crisis, the profit share has continued to rise even faster in Spain, because of the dramatic reduction of the ULC, while it recovered somewhat in Italy, because of the gradual increase of the deflator in the face of a stabilized ULC.

This analysis clearly shows how similar unit labour cost developments can be actually associated with quite different price and margin developments, and, as revealed by Figure 7, with different profitability developments in the tradable relative to the non-tradable sector.

We now turn to a more precise measure of profit margins accounting for capital, while maintaining value added as our output measure – and therefore abstracting from intermediate inputs. When capital is needed for production, margins are equal to revenues minus capital and labour costs divided by revenues (Barkai, 2016):

$$\pi = 1 - \omega - \kappa \quad (4)$$

where:

$$\kappa \equiv \frac{u \times K}{P \times Y} \quad (5)$$

is the capital cost share defined as the ratio between the cost of capital – the capital stock,  $K$ , times its user cost,  $u$  – divided by revenues. We compute the user cost of capital as:

$$u = i - \dot{P}_k + \delta \quad (6)$$

where  $i$  is the long-term nominal interest rate,  $\dot{P}_k$  is the growth rate of capital good prices and  $\delta$  is the depreciation rate of capital. We use the return of ten year government bonds as a proxy for the long term interest rate (AMECO data base), compute  $\dot{P}_k$  as the growth rate of the implicit price deflator of the stock of fixed capital at substitution prices and derive  $\delta$  as the ratio of consumption of fixed capital to the stock level (Eurostat National Accounts, EUKLEMS for Spain; OECD Stan Database for Portugal). In the Appendix we report figures for the four largest euro area economies displaying the decomposition of manufacturing value added into the labour share, the capital cost share and the profit share – Figure A.1 – the user cost of capital and capital intensity – Figure A.2.

The left panel in Figure 9 displays the change in the profit share,  $1 - \omega$ , against the change in the capital share in manufacturing between 1999 and 2015, providing a graphical representation of the different evolution of the profit share, the capital share and profit margins – the vertical distance from the 45 degree line – across EA10 countries. The right panel displays the evolution of margins over the same period of time.

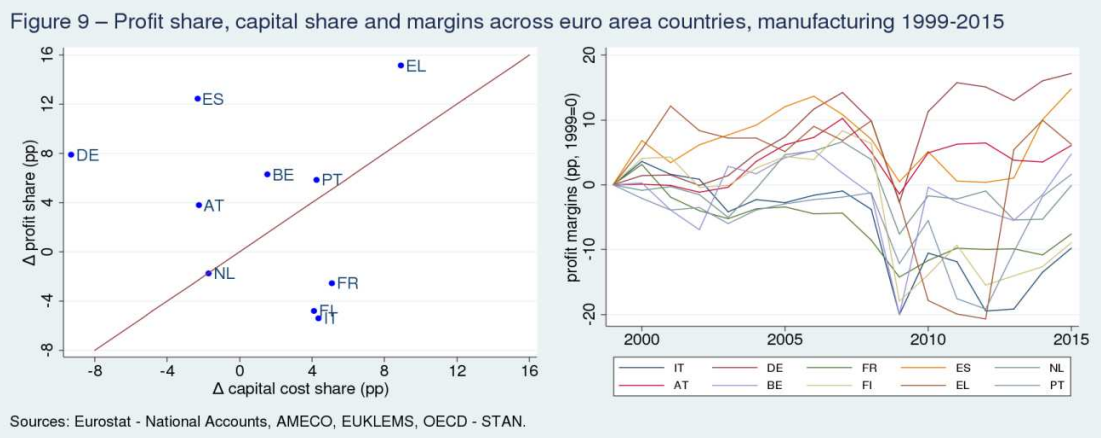


Figure 9 shows that profit margins have not been constant over time, even taking into account changes in the cost of capital. Profit margins have increased in most euro area countries, particularly in Germany, Spain and Greece, and have decreased in France, Italy and Finland. The capital cost share has decreased in Germany and in Spain and, to a lower extent, in Austria and in the Netherlands. In the case of the Netherlands, while the profit share declined, margins actually remained unchanged; in the other countries, the two measures changed in the same direction. In Germany, the marked decline of the capital cost share was due both to the decline of the user cost as well as to the decline of capital intensity – Figure A.2. Overall, during this period changes in profit margins explain a large part of movements in profit shares. This shows that movement in the gross profit share cannot be explained by changes in capital intensity and in the cost of capital, as it would be the case if it were driven by a change in the relative cost of inputs to production or by technological change.<sup>10</sup>

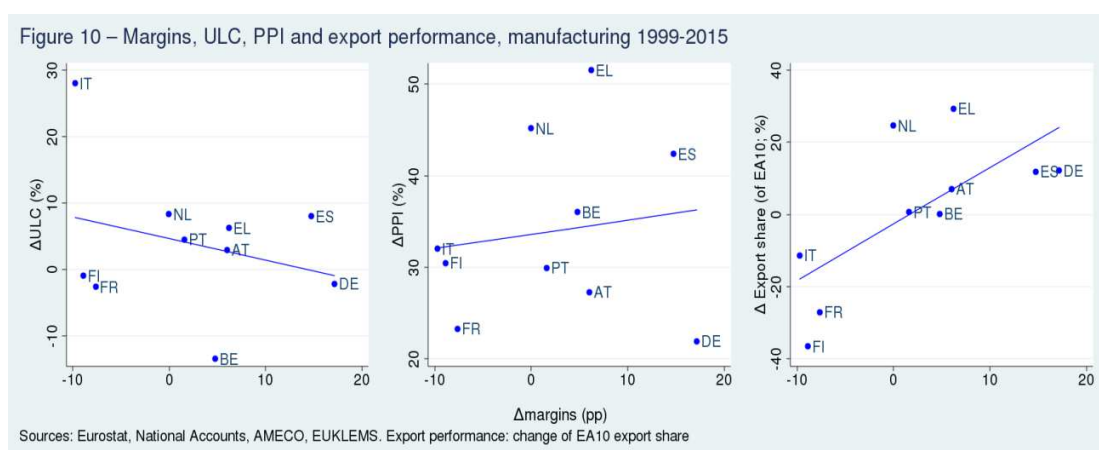
Looking at the evolution of margins over time (Figure 9, right panel) one notes the strong pro-cyclicality, which is to be expected, as well as long term trends differing from one country to another – Figure 9, right panel. The trend of margins is quite similar to that of simple profit shares: they have declined in France and Italy – though in Italy margins have recently started to recover – and, from 2007 onward, in Finland. Instead, the trend is markedly positive in Germany and in Spain.

In the next section, we explore the link between such developments and export performance.

<sup>10</sup> This is consistent with the narrative developed in recent studies for the U.S. that argue that the rise of the profit share (and the decline of the labour share) in the last 20 years is due to changes in profit margins (Autor et al. 2017, Barkai, 2016, Caballero, Farhi and Gourinchas 2017, De Loeker and Eeckhout, 2017) and cannot be explained by changes in capital intensity as suggested for example by Karabarbounis and Neiman (2014). Similarly, Torrini (2015) argues that the decline of the profit share in Italy since the early 2000s is likely due to the compression of margins.

#### 4. Margins and euro area countries' export performance: some suggestive evidence

As suggested in section 2 there are good reasons to expect an association between profit margins and international competitiveness, at the firm and, therefore, at the aggregate level. But if margins are related to international competitiveness, cost and price developments taken in isolation may provide misleading signals when assessing a country's competitiveness. In fact, if mark-ups are not constant, then costs and prices do not necessarily move together. A decline in relative costs and prices associated with declining margins may indicate that a firm has difficulties preserving its export shares, whereas a rise in costs associated with rising margins may actually be associated with an improvement in international competitiveness.

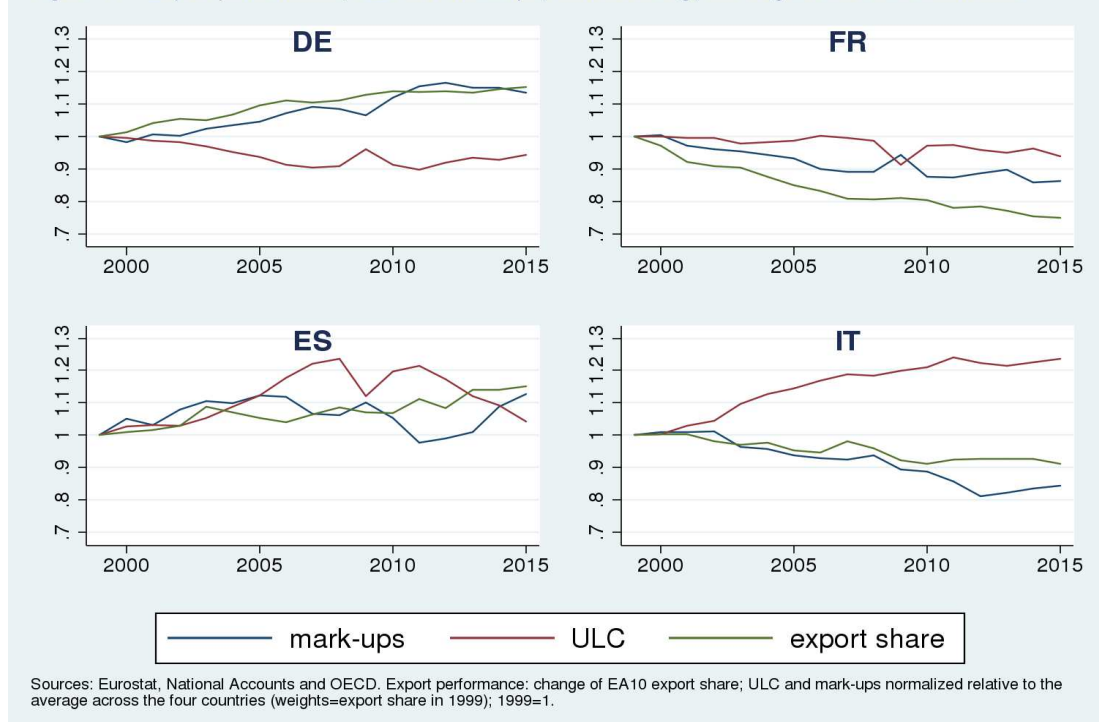


The evidence discussed above reveals that in the period considered margins have displayed remarkable variation, both over time and across countries; Figure 10 shows that this variability is not readily associated with corresponding changes in costs or prices (left and middle panels, respectively): the correlation with the ULC is negative and the one with PPI is positive, as one would expect, but the relationship is statistically weak, hinting at the fact that margins add information to costs or prices. Moreover, the right panel of Figure 10 shows a clear association between margins and export shares (relative to total exports of EA10 countries).

To further explore this correlation, Figure 11 displays the development of the export performance in the four largest euro area economies together with the development of the ULC and mark-ups<sup>11</sup> (ULC and mark-ups are normalized relative to the mean across the four countries using export shares in 1999 as weights).

<sup>11</sup> Mark-ups and profit margins are related to one another by equation 1.

Figure 11 – Export performance, ULC and mark-ups, manufacturing, four largest euro area economies



Quite conveniently, these four countries exhibit the four possible patterns that costs, margins and export can follow according to our interpretative framework. Margins can raise in response to a drop in the ULC, reflecting an improvement in international competitiveness (Germany); or they can decline along with the ULC, suggesting that firms in a particular country struggle to retain their market shares in spite of a favourable ULC development (France). Conversely, margins can remain relatively stable in spite of rising ULCs, suggesting that firms are able to transfer costs on prices without losing their competitiveness (Spain); or they can decline if firms are not able to pass on to the consumer their higher costs, losing international competitiveness (Italy). Although certainly not conclusive, this example suggests that relative margin developments should be taken into consideration in interpreting the relationship between international competitiveness and price and cost developments.

To test the strength of this correlations, we now move to a formal statistical analysis, where we regress export shares on prices, ULC and profit margins (our variable of interest). We do not aim at estimating a structural export demand equation since export, prices and margins are clearly cogenerated.

We resort to a two digit country-sector<sup>12</sup> annual panel and follow the approach that Carlin et al. 2001 used to study the link between ULC and country-sector nominal export shares for a sample of OECD countries. In this setting, we augment the export share equation with our measure of profit margins to test if the correlation shown in Figure 11 survives once we control for other covariates and country-sector fixed effects.<sup>13</sup>

Using disaggregated data for manufacturing at the two-digit level we can exploit the diversity of industry performance within countries. Moreover, we can control for country and sector specific unobservables through fixed effects. At this level of aggregation and combining data from Eurostat National Accounts, the OECD Stan database and EU-KLEMS, we can construct ULC and margin measures for all of the countries and sectors included in the sample, obtaining a balance panel spanning the 2000-2014 period. However, like Carlin et al. 2001, we do not have information for each country-sector competitor across destination to compute measures of real effective exchange rates. This implies that we can only explore the correlation between country export shares of total EA10 export and the relative dynamics of covariates *vis-a-vis* the EA10 countries included in the sample. Following Carlin et al. 2001, we compute measures of relative prices, relative ULC and relative profit margins with respect to the weighted averages of the same variables for EA10 countries.<sup>14</sup>

We also include in the analysis a measure of potential demand defined as follows:

$$Q_{ijt} = \sum_d M_{djt} \frac{X_{ijd1999}}{M_{dj1999}}$$

where  $M_{djt}$  denotes country  $d$  imports of goods produced in sector  $j$  at time  $t$  and  $X_{ijd1999}/M_{dj1999}$  is country  $i$  share of country  $d$  imports in 1999 of goods produced in

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<sup>12</sup> Like in the previous sections we exclude Luxembourg due to lack of data and Ireland for problems related with activity of multinational corporations and the recent revisions of national accounts. The 12 manufacturing sectors herein considered are: Manufacture of food products, beverages and tobacco C10-C12; Manufacture of textiles, wearing apparel, leather and related products C13-C15; Manufacture of wood, paper, printing and reproduction C16-C18; Manufacture of chemicals and chemical products C20; Manufacture of basic pharmaceutical products and pharmaceutical preparations C21; Manufacture of rubber and plastic products and other non-metallic mineral products C22-C23; Manufacture of basic metals and fabricated metal products, except machinery and equipment C24-C25; Manufacture of computer, electronic and optical products C26; Manufacture of electrical equipment C27; Manufacture of machinery and equipment n.e.c. C28; Manufacture of motor vehicles, trailers, semi-trailers and of other transport equipment C29-C30; Manufacture of furniture; jewelry, musical instruments, toys; repair and installation of machinery and equipment C31-C33. Coke, Refined Petroleum and Nuclear Fuel C19 is dropped due to the fact that it is a clear outlier, as prices and sector performance disproportionally depend on oil price developments.

<sup>13</sup> A similar framework was used by Fabrizio et al. 2007 to study the development of aggregate export shares across a large number of developed and developing countries.

<sup>14</sup> We compute the weighted average of production prices, ULC and margins, using as weights the country sector 1999 export shares. The relative indicator is computed by taking the log difference between the country sector value and the average value of the indicator, for prices and ULC and the simple difference for profit margins defined in equation (2).

sector  $j$ . In the export share equation, we include potential demand in relative terms, as a ratio to the sum of the country-sector potential demand of the euro area countries included in the sample.

Our benchmark specification is the following:

$$\Delta \ln(XS_{i,j,t}) = \Delta \ln(\varsigma_{i,j,t}) + \beta_2 D\pi_{i,j,t} + \beta_3 \Delta \ln(QS_{i,j,t}) + \gamma_{i,t} + \gamma_{i,j} + \varepsilon_{i,j,t} \quad (5)$$

where,  $i$ ,  $j$ , and  $t$  denote country, sector and time respectively,  $XS$  is nominal export share,  $QS$  is the country sector relative potential demand;  $\varsigma$  is a placeholder for either the relative ULC or PPI index,  $\pi$  stands for relative profit margins. Finally,  $\gamma_{i,t}$  are country-year fixed effects and  $\gamma_{i,j}$  are country-sector dummies. The country-year dummies will absorb the effect of country specific yearly shock (for instance to the nominal effective exchange rate) that could simultaneously affect export and covariates at the country level. The country-sector dummies control for country-sector specific trends. Although country-sector shares cannot grow forever, in a relatively short period of time it is possible to observe trends in export shares which are not related to the covariates included in the statistical model.  $\Delta$  denotes the long (three year) difference operator, as we want to focus on the medium-run association between export and covariates, overlooking short lived effects. Similar results are obtained considering averages over three-year non-overlapping periods, the approach followed by Fabrizio et al. 2007.<sup>15</sup>

Table 1 displays OLS estimates, separately including the three variables of interests (standard errors are computed clustering at the country-sector level). The first three columns refer to a specification that only controls for country-year effects, while columns from 4 to 6 show results for a specification that allows for country-sector specific trends. In all specifications, the coefficient on (relative) potential demand is not significantly different from zero. This shows that relative developments of potential demand measured at the country-sector level – which are only affected by country-sector differences in the geographical destination of goods – cannot explain the observed movements in country-sector export performance. Fixing a particular sector, to the extent that EA10 countries have similar trading partners, relative potential demand will be essentially constant.

Without controlling for country-sector specific trends, the relative production price index parameter turns out to be positive and statistically significant. Similar results were obtained by Fabrizio et. 2007, who found that European countries export shares in nominal terms were positively correlated with the PPI based REER. This result is likely to reflect endogeneity problems and, possibly, the quality upgrading of products, not entirely

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<sup>15</sup> We obtain the same results when considering longer time lags or taking averages over longer periods.

reflected in the estimates of production price dynamics. However, the relative price parameter gets virtually to zero once we control for country-sector specific effects.<sup>16</sup>

**Table 1: Export share equation estimates**

Dependent variable $\Delta \ln(XS_{i,j,t})$	(1)	(3)	(5)	(2)	(4)	(6)
$\Delta \ln(PPI)$	0.17** (0.082)			-0.03 (0.199)		
$\Delta \ln(ULC)$		-0.12** (0.061)			-0.13** (0.059)	
$\Delta Margins$			0.19** (0.078)			0.18*** (0.060)
$\Delta \ln(QShare)$	-0.10 (0.089)	-0.10 (0.090)	-0.07 (0.096)	-0.15 (0.113)	-0.15 (0.109)	-0.12 (0.110)
<b>Fe</b>						
Country x Year	YES	YES	YES	YES	YES	YES
Country x Sector				YES	YES	YES
R2 adjusted	0.14	0.15	0.67	0.24	0.26	0.26
Observations	1,560	1,560	1,560	1,560	1,560	1,560

Dependent variable is the delta 3 log of nominal export share. Manufacturing two-digit sectors. Countries: AT, BE, DE, EL, ES, FI, FR, IT, NL, PT. Years 2000-2014. PPI, ULC, Margins are production prices, ULC and profit margins relative to the country-sector year average. Q is potential demand. Standards errors clustered at the country-sector level, in parenthesis. \*\*\* 1%, \*\*5%, \*10%\* significance level.

The ULC parameter is negative and statistically significant in both the more parsimonious specification (column 3) and the one which includes country-sector specific trends (column 5). This implies that relative PPI and relative ULC dynamics do not convey the same information.<sup>17</sup> As to the relative margins, we find a positive correlation with the export performance. The parameter is positive and significant in both specifications. Once again, we want to stress that we are not here looking for a causal relation between margins and export. Rather we want to test, in a statistical robust framework, the positive association between profitability and country export performance observed in previous sections.

In Table 2 we report results obtained jointly considering relative profit margins, relative PPI and relative ULC. Relative ULC and profit margins remain significant with an almost unchanged parameter when included in the regression with PPI (columns 1 and 2).

<sup>16</sup> In terms of volumes, this would imply an elasticity of minus one which is quite implausible for an exogenous variation of relative prices.

<sup>17</sup> This should advise some caution when ULC and prices are used interchangeably for the computation of REER measures.



However, once we jointly consider profit margins and ULC (column 3), profit margins remain significant while ULC is not significant anymore.

**Table 2: Export share equation estimates**

Dependent variable $\Delta \ln(XS_{i,j,t})$	(1)	(2)	(3)
$\Delta \ln(PPI)$	0.06 (0.179)	-0.02 (0.171)	
$\Delta \ln(ULC)$	-0.13** (0.059)		-0.04 (0.071)
$\Delta Margins$		0.18*** (0.059)	0.15** (0.069)
$\Delta \ln(QShare)$	-0.14 (0.11)	-0.12 (0.112)	-0.12 (0.084)
<b>FE</b>			
Country x Year	YES	YES	YES
Country x Sector	YES	YES	YES
R2 adjusted	0.26	0.26	0.27
Observations	1,560	1,560	1,560

The dependent variable is the delta 3 log of nominal export share. Manufacturing two-digit sectors. Countries: AT, BE, DE, EL, ES, FI, FR, IT, NL, PT. Years 2000-2014. PPI, ULC, Margins are production prices, ULC and profit margins relative to the country-sector year average. Q is potential demand. Standards errors clustered at the country-sector level, in parenthesis. \*\*\* 1%, \*\*5%, \*10% significance level.

Results shown in table 1 and 2 are qualitatively very similar, once we restrict the sample to the four largest countries of the area. Similar results are also obtained estimating a more standard export equation (in absolute terms), although, in this case, exports turn positively and significantly correlated with potential demand, as expected.

These results suggest that the relative cost dynamics is significantly associated with export performance in so far as firms are not able to safeguard their profit margins, possibly through a quality upgrading of their products. Moreover, it suggests that in the assessment of euro countries competitiveness vis-à-vis their partners, a whole range of indicators, including firm profitability, should be taken into account, also considering the quite heterogeneous patterns profitability has followed since monetary union.

## 5. Conclusions

In this paper we analyse patterns of convergence (divergence) across euro area countries in the manufacturing sector since the inception of the monetary union and show that not only prices and costs followed diverging trajectories, but profitability as well.

We also show that profitability developments as measured by profit margin rates (i.e. the profit share of value added net of capital usage costs) only partially overlap with those of producer prices (PPI) and of unit labour costs (ULC), which have been more widely investigated in the literature. Namely, countries exhibiting a loss of competitiveness – as measured by ULC dynamics or PPI dynamics – have in some cases experienced a rise in the profitability of tradable sectors, whereas countries with a moderate ULC or PPI dynamics have in some cases recorded a reduction in profitability of tradable sectors. Countries exhibiting an improving profitability in manufacturing also tend to show a relative improvement with respect to non-tradable sectors profitability.

Moreover, we observe that manufacturing export performance of euro area countries, can be better understood once we jointly consider standard cost/price measures of competitiveness and profit margins. In particular, we remark that, considering the four largest euro area countries, export performance was markedly more robust in Germany and in Spain than in France and in Italy, consistently with the developments recorded by profit margins across these countries. Instead, measures of competitiveness based on ULC or prices can hardly explain the poor performance of France vis-à-vis Germany and even more so with respect to Spain.

This is consistent with the recent trade literature, emphasizing firm heterogeneity and imperfect competition. In such models, higher competitiveness is associated with higher margins, because of the ability of more efficient firms or firms offering better products to charge higher mark-ups relative to their competitors. On the other hand, higher costs and prices may be positively associated with a firm competitiveness if they reflect better product quality. We argue that profit margins should be considered together with other more standard competitiveness variables when trying to assess the role of non-price competitiveness, which has been shown to play an increasingly important role in euro area countries. We support this argument by providing empirical evidence of a positive correlation between export performance and profit margins in country sector panel regressions, where we control for standard competitiveness indicator (either ULC or PPI) and potential demand.

As to Italy, since the inception of the monetary union both profitability of the manufacturing sector and goods export shares have declined, showing clear signs of a loss of competitiveness. However, in most recent years, both the export performance and profit margins in manufacturing have clearly improved: export share at current values has been recovering (Bugamelli, Fabiani, Federico, Felettigh, Giordano and Linarello, 2017) and the gross profit share of value added has been increasing since 2012, returning in 2016 to the level observed just before the global recession.

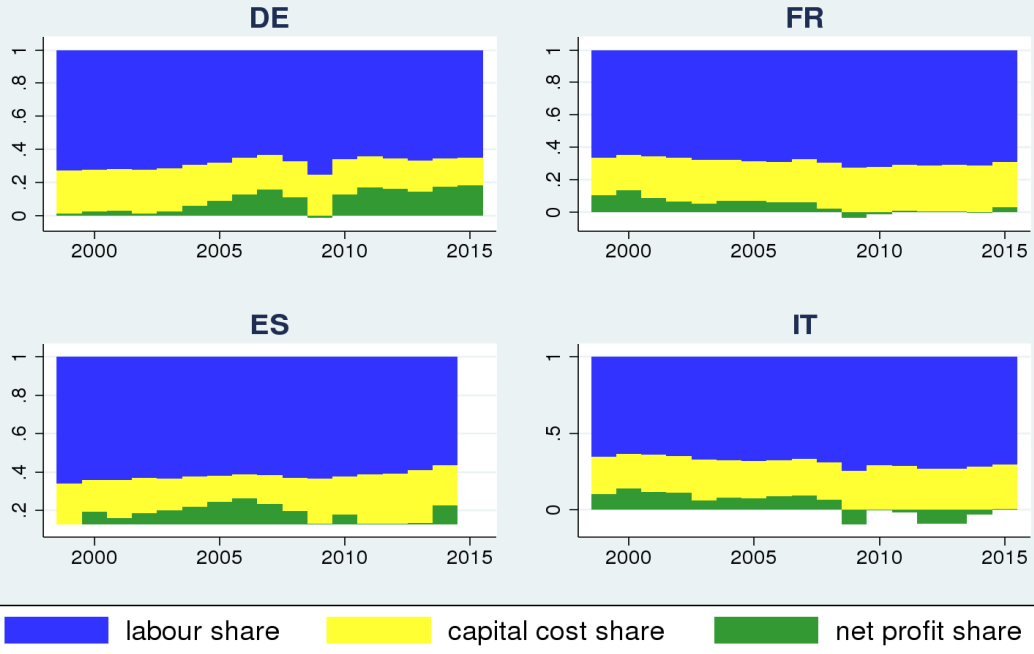
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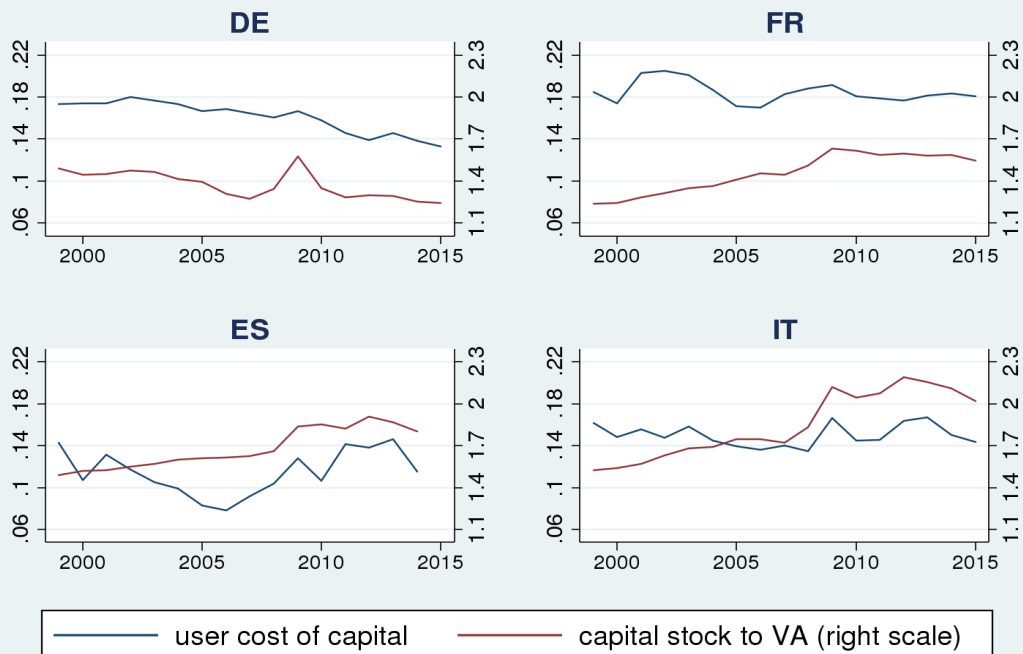
## Appendix

Figure A.1 – Labour cost, capital cost and net profits as shares of VA, manufacturing, four main EA economies



Source: Eurostat, National Accounts and EUKLEMS.

Figure A.2 – Components of capital cost share of VA, manufacturing, four main EA economies



Source: Eurostat, National Accounts and EUKLEMS.