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EXPLORING PRICE AND NON-PRICE DETERMINANTS OF TRADE FLOWS IN THE LARGEST EURO-AREA COUNTRIES

by Claire Giordano and Francesco Zollino[1]

Abstract

Since the mid-2000s standard price-competitiveness indicators for some European countries have been providing conflicting signals, particularly in Italy. Against a broad stability of the producer price (PPI)-based measure, the manufacturing unit labour cost (ULCM)-deflated indicator points to a major cumulated loss of competitiveness in Italy. We find that this discrepancy mostly reflects the divergence of ULCM and PPI trends in competitor countries while in Italy they have actually progressed hand in hand. Owing to the internationalization of production processes and to the subsequent fading representativeness of labour in respect of overall costs, seen to a different degree across countries, price-based indicators are arguably more appropriate than those based on ULCMs to assess external competitiveness and external performance. We provide empirical evidence that points in the same direction. In Italy ULC-based indicators play a less important role relative to price-deflated measures in explaining both export and import trends; this result does not hold for Germany and France. Moreover, a proxy for non-price competitiveness proves important in explaining Italian, German and, in particular, Spanish exports.

JEL codes: F14; F62.
Keywords: price competitiveness, non-price competitiveness, unit labour costs, producer prices.

Contents

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1. Introduction[1]

The issue of a sound assessment of a country's price competitiveness has recently returned to the forefront of the international academic and institutional debate. In particular, the information content of standard indicators of relative costs and prices has been questioned because: *i)* alternative price-competitiveness indicators have not always provided consistent signals in a given country; *ii)* their trends have often shown a weak correlation with external performance, more prominently regarding the increasing current account imbalances within the euro area in the decade prior to the eruption of the global financial crisis.

Focusing on trends in the four largest countries in the euro area, we observe a widening dispersion of alternative price-competitiveness measures in recent years, in particular in Italy. The issue of the divergence between the various price-competitiveness indicators for Italy has been debated at the international level. Among others, Paul Krugman (2012a; 2012b) has questioned the reliability of the Italian ULC-based indicators, pinpointing their links with the "[country's] mysterious productivity collapse". The European Commission has also warned about the uncertainty surrounding the size of Italy's real exchange rate appreciation up to the outbreak of the global financial crisis, stressing the larger loss in external competitiveness when considering ULC-deflated indicators relative to those based on prices (European Commission 2012, pp. 13-14; 2014, pp. 30-31). In this regard, both Krugman (2012a; 2012b) and the European Commission (2012) cite an IMF study, which bluntly states *"[w]hile Italy's competitiveness does appear to have eroded [since 1995], the size of this effect is, frankly, anyone's guess*" (Bayoumi et al. 2011, p. 5).

The first part of the present paper shows that the conflicting signals coming from unit labour cost in manufacturing (ULCM)- and producer price (PPI)-based competitiveness indicators is not due to the divergent trend of the two deflators in Italy; it therefore does not signal an unsustainable behaviour of profit margins of Italian firms, unlike what is usually implicitly assumed. A simple cointegration framework actually shows a stable long-run relationship between PPIs and ULCMs in Italy since 1993. Rather, the divergent developments of Italy's competitiveness indicators are mostly due to the increasingly different trends in ULCMs and PPIs in some of Italy's main trading partners, and particularly in Germany. This is likely not to reflect differences in the total costs of production but to be related to the varying extent to which the share of intermediate inputs in production functions have changed across countries, largely as a result of the different intensity of offshoring.

These findings signal that ULCM-based indicators may provide unreliable insights into competitiveness trends in the euro-area countries, and especially in Italy.[2] A similar risk has long been recognized for Germany by the Bundesbank (which fifteen years ago already raised concern about the adoption of ULCM-deflated indicators to portray the price competitiveness of German exporters; Deutsche Bundesbank 1998; 2004) and by the ECB, according to which "*the German ULCM-based indicator suggests the need for a rather cautious interpretation of ULCM-based REERs*" (European Central Bank 2003, p. 71). These considerations ought to be extended to Italy's ULCM-based REER, as its divergent behaviour relative to the other indicators largely hinges on changes in its competitors' production processes, namely the role of inputs other than labour in determining production costs.

[1] Our thanks to Eugenio Gaiotti and Stefano Siviero for their insightful comments and support during the different stages of our research. We acknowledge the helpful contribution of Michele Caivano, Alberto Felettigh and Pamela Minzera in the construction of our dataset. We are also grateful to our discussant, Fabiano Schivardi, and to all the participants of an internal seminar at the Bank of Italy, a WGF Meeting and two COMP.NET Conferences held in Frankfurt-Am-Mein and Rome for their useful comments on previous versions of the paper. All errors remain our own. The views presented are those of the authors alone and not necessarily of the Institution represented.

[2] An extract of our arguments was published in Giordano and Zollino (2013).

After assessing the possible statistical drawbacks underlying the ULCM-based measure, in the second part of the paper we explore the different explanatory power of alternative price-competitiveness indicators for a selection of countries. For this purpose, we estimate dynamic equations for exports and imports between 1993 and 2012 for Italy, France, Germany and Spain. To date the received literature has not produced any strong conclusions in this respect.[3]

Our findings for Italy show a less important role of ULC-based indicators relative to price-deflated measures both in the export and import equations. The same result does not hold for Germany and France, whereas Spanish exports do not prove statistically correlated to any price-competitiveness indicator, providing evidence in favour of the so-called "Spanish paradox". In order to explore the role of non-price competitiveness, we experimentally develop a relative economy-wide total factor productivity (TFP) indicator, by which we compare a country's performance in total economy efficiency and ability to innovate against the same basket of competitors included in the price-competitiveness indicators. With the exception of France, we find that relative TFP exerts a significantly positive impact on exports in the countries under analysis, with a particularly strong effect observed for Spain, plausibly in line with the major structural reforms implemented there in recent years. As regards imports, in line with the existing empirical literature we find that the role of price competitiveness is controversial, possibly due to the changing role of energy, raw material and intermediate inputs as a by-product of the increasing participation in global value chains by the countries considered.

The paper is organised as follows: Section 2 reviews the range of most frequently employed price-competitiveness indicators. Section 3 traces recent trends in the main euro-area countries. Section 4 explores the reasons why ULCM-based indicators may convey biased signals compared with price-based ones, providing quantitative evidence and a numerical simulation. Section 5 defines the baseline dynamic export and import equations and describes the data used for the four largest euro-area countries; it also presents estimation results concerning external trade performance in Italy, Germany, France and Spain over the period 1993-2012, including some sensitivity analysis. Section 6 focuses on export and import performance in the long-run (i.e. since 1980) in Italy, the only country for which the necessary data are available, in order to capture any structural breaks in the series employed. Section 7 enriches the export equations of the countries under study by including a proxy of non-price competitiveness. Section 8 reassesses the import equations to take into account import intensity-adjusted demand components. Section 9 gives our main conclusions.

2. A brief survey of price-competitiveness indicators

The price competitiveness of a country is usually approximated by the real effective exchange rate (REER) of its currency, i.e. a weighted geometric average of nominal exchange rates of a country's main trading partners, deflated by relative deflators:

$$(1) \quad REER = \prod_{i=1}^{n} \frac{P}{(P_i^* e_i)^{\omega_i}}$$

Given how it is constructed, an increase in the REER implies a loss in competitiveness. The indicator is conditional on the selected number of trading partners and of outlet markets, on the chosen weighting scheme and, even more so, on the adopted deflator. No consensus on the ideal price-competitiveness measure has been reached from a theoretical standpoint since the seminal contribution by Armington (1969), which derived the optimal weighting system for REERs, while leaving the choice of deflator open.

[3] See, for example, Ca' Zorzi and Schnatz (2007).

Depending on the type of deflator used, REERs may be either price- or ULC-based. In particular, the following deflators are commonly used, each of which has both advantages and shortcomings for the measurement of a country's external competitiveness:

- Consumer price indices (CPIs) are available on a monthly basis and are constructed using largely homogeneous methodologies across countries. They include traded services as well as goods, and are available for all advanced and a large set of emerging economies. For these reasons, they have been adopted by the European Commission within the newly set-up Macroeconomic Imbalance Procedure. Yet they focus solely on consumer goods, including imported goods and services, and exclude capital and intermediate goods. They are also subject to distortions owing to fiscal measures.

- Producer price indices (PPIs) are also monthly indicators and are less affected by taxes and subsidies than CPIs. They refer to all categories of manufactured goods (consumer, intermediate and capital) but omit any information on services.

- GDP deflators refer to all sectors and all types of goods and services, but they are not fully comparable across countries due to the controversial measurement of services' activity and are subject to significant composition effects between the public and private sectors. Moreover, they are available on a quarterly basis with a significant lag relative to the reference period and may be subject to significant revisions.

- Unit labour costs in manufacturing (ULCMs), in addition to referring solely to one sector, ignore other components of production costs, so that their evolution may be affected by the possible substitution of material inputs, labour and capital. Furthermore, they are available on a quarterly basis mostly for advanced economies, while their publication is either missing or subject to considerable delay for most emerging ones.

- On the one hand, unit labour costs in total economy (ULCTs) include all sectors of the economy, so are less affected by input substitution (as possible changes in sectoral interlinkages become irrelevant); on the other hand, they share the remaining drawbacks of ULCMs, in addition to the possible bias due to the tricky measurement of services' activity and to potentially large sectoral composition effects.[4]

The price-competitiveness indicators that have received the most attention in both the academic and policy-oriented literature are PPI- and ULCM-based REERs, since they closely track price and cost conditions in industries that are traditionally more open to international trade. However, given that services represent an ever larger share of total activity in advanced economies and that they play an increasing role in international exchanges, ULCTs and GDP deflators have also been frequently employed.

Empirically all indicators have been, and continue to be, used. In normal circumstances, within a reasonably stationary productive environment, they should provide a consistent picture, at least in the long run. If this is not the case, one is bound to conclude that some of the above-mentioned drawbacks have become particularly relevant. In the current context of intense globalization, the issues related to ULCM-based REERs appear to prevail, as we shall show further on.

[4] A further, theoretically attractive, deflator refers to export prices, which by definition are attached solely to traded goods. However, they are subject to significant limitations as they are often measured in terms of export unit values, making any cross-partner comparison very difficult given their dependence on the country-specific pattern of trade (Neary 2006). More recently, genuine export price indices are becoming available for some countries, but their number is still limited and the time series are short.

3. Recent trends in price-competitiveness indicators in the main euro-area countries

In the four largest economies in the euro area, since the late 1990s the difference between alternative REERs has increased, after moving more closely together in the past (Fig. 1). The signals are particularly conflicting for Italy, where ULCM-based REERs diverge from all the other indicators, which instead depict a broadly consistent picture.

For all the countries considered, the size of the dispersion of the different indicators (measured by the yearly standard deviation) is currently above its long-term average (Fig. 2; left-hand side panel); in Italy, in particular, it has risen incessantly since 2002 and is currently at a historical high. Notably, when excluding the ULCM-based indicator, the dispersion across Italy's indicators is approximately reduced to a third and currently stands around its long-run average, whereas the impact of this exclusion is more negligible for the other countries (Fig. 2; right-hand side panel); furthermore, the standard deviation computed for Italy becomes the lowest of the four economies considered in recent years.

Policy implications from alternative indicators may vary widely. Concerning Italy's competitiveness trends, the ULCM-based REER signals a large loss of 33.9 percentage points since the inception of European Monetary Union (EMU), against a deterioration of 2.8 and 2.7 percentage points in France and Spain, respectively, and a gain of 14.1 points in Germany (Table 1). However, on the basis of all the other indicators, the picture for Italian exporters looks very different. The total unit labour cost (ULCT) measure reveals a smaller loss in price competitiveness in the overall period (7.1 percentage points), although the gap *vis-à-vis* its German partners remains sizeable (over 23 percentage points).

According to PPI indicators, since 1999 Italy's price competitiveness has deteriorated by just 0.3 percentage points, compared with an 11.7 point loss in Spain and relatively moderate gains of 6.1 and 9.4 in France and Germany, respectively. The overall loss for Italian exporters proves slightly higher based on GDP deflators and CPIs (1.3 and 2.6 percentage points, respectively), yet significantly more contained relative to ULC-based measures.

It is sometimes argued that the conflicting behavior of ULCM- and PPI-based REERs shows that Italian industrial firms have long been squeezing their margins to offset the increasing pressures coming from labour costs; as more pressure is apparently in the pipeline, so the story goes, this will fuel concern about a dramatic loss in competitiveness in the near future as margin restraints risk becoming unsustainable. A glance at institutional sector accounts, however, suggests that in the years 2003-2007, in which the ULCM-based REER sky-rocketed, the profit rate of non-financial corporations in Italy recorded only a moderate decrease, of around two percentage points, in the period as a whole. In the following sections we put forward further arguments to show that an alarming reading of the ULCM- and PPI-based indicator discrepancy is unwarranted.

4. Explaining recent developments in Italy's ULCM-based indicator

It has been argued that ULC-based indicators are preferable in that they ideally capture developments in a country's external competitiveness that are sustainable in the medium term, while disregarding the temporary adjustments in profit margins that may affect a price-based REER.

However, this argument is correct only if the ULC-based indicator can be considered to reliably control for all the main components of production costs. This condition is easily met in a stationary environment in which factor shares do not change significantly. By contrast, the recent intense globalization of production processes has led to major changes in the shares of labour, capital and intermediate goods in the value of industrial output, thus reducing the representativeness of wages in terms of total production costs within a country. Even more relevant for competitiveness measures, which hinge on *relative* trends in both the domestic economy and the main partners, is

that the reduction may proceed at a different speed in individual economies: the risk that the ULCM-based REER leads to biased assessments of a country's competitiveness accordingly increases.

In order to assess the economic explanation of the different behaviour of ULCM- versus PPI-based REERs, first we gauged the long-run correlation between producer prices and labour costs in each country's manufacturing sector. A visual inspection of the two series shows different results within each country: over the last two decades, they move very closely in Italy and, to a large extent, in Spain, less so in France, while in Germany they have appeared to be unrelated since at least the mid-2000s (Fig. 3).[5]

A more formal test is presented in Table 2, which reports the results of simple cointegrating regressions for each country. A sound long-run relationship between PPIs and ULCMs shows up only for Italy, where the cointegration hypothesis cannot be rejected with reasonable confidence. Besides Spain, for which the short time-span may affect the results as data on ULCMs are available since 2000, a long-run comovement is rejected for Germany and France. In fact, a glance at residuals points to a deterioration in the relationship between PPIs and ULCMs in these two countries since the mid-2000s, while in Spain the discrepancy widened after the start of the global crisis (Fig. 4).

Secondly, we run a numerical simulation in order to shed light on why Italy's ULCM- and PPI-based REERs diverge so significantly, notwithstanding the co-movement of the underlying domestic deflators in the long run. In particular, we build artificial price-competitiveness indicators for a limited number of trading partners, namely country A, B and the Rest of the World (RoW), under the following assumptions: *(i)* nominal exchange rates are fixed; *(ii)* country B is a major trading partner of country A, whereas the relevance of country A for country B is much smaller (as is the case of Italy and Germany, respectively); *(iii)* trends in PPIs and ULCMs are broadly similar in country A, whereas the dynamics of ULCMs are more contained than those of PPIs in countries B and RoW; *(iv)* trends in ULCMs are lower in countries B and RoW than in A; developments in PPIs are similar across the three countries (as seen in Fig. 3).

In this simplified setup the workings of the basic arithmetics of REERs can be clearly seen. Focusing on a comparison between countries A and B, firms in country A suffer from lower ULCM than PPI growth in both their partners, while country B exporters on the one hand face only one partner (RoW) in this condition and on the other hand directly gain from their lower domestic ULCM dynamics than PPIs. As a result, *i)* the discrepancy in the PPI-based REERs of the two countries is limited, but *ii)* the ULCM- versus PPI-based REERs in the former country show a larger disconnect than in the second country (Fig. 5).

What are the reasons for the divergence of PPIs and ULCMs in Germany (the country where it is most evident in recent years among Italy's partners)? A full explanation is beyond the scope of this paper. However, one may advance a few alternative theories. On the one hand, there may be a role for an expected convergence in the wage share owing to the initially high levels reached in Germany in the early 1990s, perhaps as an effect of the country's reunification. On the other hand, yet partly related to the previous argument, a key factor could trace back to the intense internationalization of production that accompanied the increasing use of intermediate inputs, most of all in large manufacturing sectors.[6] Less pronounced offshoring in Italy, and therefore less

[5] As ULCMs are usually calculated as the ratio of the wage bill to value added and PPIs refer to gross production, it could be argued that the discrepancy between the two deflators may reflect the different treatment of intermediate inputs (excluded and included in the respective measure of activity). However, as shown in research in progress at the Bank of Italy, when ULCMs are assessed with respect to *gross* production their trends in countries such as Germany are not particularly different from those based on value added.

[6] This conjecture is consistent with the so-called "bazaar economy" hypothesis advanced by Sinn (2005), according to which "*more and more German industrial firms are shifting labour-intensive portions of their value added chain to*

sizeable changes in Italy's manufacturing shares of wages and intermediate goods can explain the stability of the relation between its prices and labour costs. This is confirmed by the observation that the use of material intermediate goods increased significantly in Germany from 1995 to 2005, whereas it was relatively stable in Italy (Fig. 5).[7] Wage shares have also witnessed a generalized fall since the mid-1990s, which has been particularly sharp in Germany's manufacturing sector, especially between 2000-2007. The drop in Italy's wage share has proved more contained with respect to its trading partners, hence pushing up its ULCM-deflated competitiveness measure.[8]

Given the fading representativeness of labour costs in the manufacturing sectors of advanced economies, relying solely on ULCM-based indicators may provide a biased assessment of price competitiveness. Price-based indicators seem to convey more reliable signals. This assessment is further investigated in the empirical analysis developed in the following sections.

5. The baseline trade flows model: data, results and robustness checks

In order to appraise the respective role of alternative price-competitiveness indicators in explaining the trade flows of the four countries under study, we estimated standard reduced-form dynamic trade equations. The standard formulation for the export and import equations is based on the partial equilibrium model of international trade presented in Goldstein and Khan (1985); a more recent review of this modelling approach is Sawyer and Sprinkle (1996).

In particular, the baseline export equation takes the following form:

$$(2)\ \Delta x_t = \beta_0 + \beta_{1i}\sum_{i=1}^{4}\Delta x_{t-i} + \beta_{2i}\sum_{i=0}^{4}\Delta reer_{t-i} + \beta_{3i}\sum_{i=0}^{4}\Delta fd_{t-i} + \varepsilon_t,$$

where real exports x are regressed against a selected price-competitiveness indicator (*reer*) and foreign demand (*fd*). A rise in price competitiveness (measured by a decline in the REER) and/or in foreign demand is expected to support export growth.

The baseline import equation is instead:

$$(3)\ \Delta m_t = \delta_0 + \delta_{1i}\sum_{i=1}^{4}\Delta m_{t-i} + \delta_{2i}\sum_{i=0}^{4}\Delta x_{t-i} + \delta_{3i}\sum_{i=0}^{4}\Delta reer_{t-i} + \delta_{4i}\sum_{i=0}^{4}\Delta dd_{t-i} + \eta_t$$

where real imports (m) are regressed against real exports (x), owing to the significant import content of exports, a selected price-competitiveness indicator (*reer*) and domestic demand (*dd*). An increase in exports and/or in domestic demand should boost imports, whereas a rise in competitiveness could have the opposite effect on imports as it makes domestic goods cheaper relative to imported merchandise.

The empirical literature has often focused solely on the export equation (for instance, Ca' Zorzi and Schnatz, 2007; European Commission, 2010; Bayoumi et al. 2011), with only a few studies estimating both models (Allard et al., 2005; J.P. Morgan, 2013). We estimated our export and

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foreign subsidiaries (offshoring) or buy intermediate products from subcontractors abroad (outsourcing) in order to escape the high German labour costs. Germany expands its position as world bazaar and boasts of its high level of exports". Between the mid-1990s and the eve of the financial crisis, in Germany the share of intermediate inputs in total gross production scored a net increase in leading industrial sectors such as transport equipment (from 71 per cent to about 75 per cent) and chemicals (from 66 to 70 per cent).

[7] Disaggregated data on intermediate goods (energy, materials, services) come from the EUKLEMS database, where they are only available until 2005 for materials. We focus on the latter since they might be a close proxy for imported materials as we consider intermediate inputs of the manufacturing sector as a whole.

[8] Between 2000 and 2007 the ratio of gross operating profit to value added for non-financial firms in Germany increased by 6 percentage points (to 42 per cent), starting from a comparatively low value. In Italy it fell from 47 to 43 per cent; in France it remained essentially unchanged.

import equations over a longer time horizon than many existing studies, in particular including the period subsequent to the outbreak of the recent financial crisis, and referring to a four-country sample (Italy, Germany, France and Spain), as opposed to the euro area as a whole.[9]

Our dataset is built using quarterly national account data on the volume of exports and imports of goods over the period 1993Q1-2012Q4 (last period for which all variables were available).[10] Imports of goods for Italy were net of energy products, by using Istat monthly trade volume data.[11] We alternately included in our equations the five price-competitiveness indicators from the ECB and Bank of Italy sources. Foreign demand for Italian goods is computed as the weighted average of real imports of goods of Italy's 75 trading partners, where the (rolling) weights represent Italy's export shares in the previous three-year period (Bank of Italy calculations on IMP-WEO, Istat and CPB Netherlands data); for Germany, France and Spain world demand of ECB sources was used.[12] Domestic demand is taken from national accounts data (Istat, Eurostat).

Since we find evidence of non-rejection of the unit root hypothesis for all key variables, first differences were taken as shown in equations (2) and (3). We estimated our export and import equations separately via Ordinary Least Squares (OLS) and, for a robustness check against a possible endogeneity bias, as a system of two equations via Full Information Maximum Likelihood (FIML). The results were very similar in all cases. For the sake of brevity, we chose only to present the OLS estimation results. Since the variables are expressed in logs, the coefficients may be easily interpreted as elasticities.

Table 3 provides the baseline export equation results. All estimated coefficients present the expected signs and are statistically significant, generally explaining more than half of the variance of the dependent variable, with the exception of the lower fit of the equation for Spain (which has an adjusted R-squared of 0.4). Although four lags of both the dependent and explanatory variables were originally included in the regression, only contemporaneous determinants prove significant. The sole exception regards price competitiveness in Italy, which shows a more persistent effect than in the other main countries of the euro area and a larger overall size, thus confirming the higher vulnerability of Italian firms to both currency appreciation and to competitive pressures from emerging countries.

Taking into account that the alternative specifications of the export equation differ only by the selected competitiveness indicator, we find that the difference between the two classes of measures in Italy is statistically significant, with the explained variance marginally higher when the price-based measures are adopted. For a sounder control, we implemented a pair-wise encompassing test, as in Ca' Zorzi and Schnatz (2007). First, we included all possible pairs of REERs simultaneously in the estimation, then the ones that had the highest p-value were dropped. In all possible combinations, the ULCM- and ULCT-based measures were over-performed by price-based indicators. According to price-based measures, the long-run price elasticity of Italian exports,

[9] Research currently under way at the ECB (Christodoulopoulu and Tkacevs 2014) also estimates both equations, considers a time-span only two years shorter than ours, and focuses on the complete sample of euro-area countries.

[10] The share of goods on total exports on average over the period 1999-2012 is 85 per cent in Germany, 81 in Italy, 79 in France and 68 in Spain. The higher percentage of service exports in Spain relative to the other economies is largely due to the significant impact of its tourist industry. The fit of our baseline models is unsatisfactory when service flows are employed as the dependent variable. This result is unsurprising considering the fact that for example price-competitiveness indicators are weighted on the basis of merchandise trade flows. Research under way at the ECB aims to build new price-competitiveness indicators, adjusted for service flows; see Christodoulopoulu and Tkacevs (2014) for results concerning trade in services.

[11] We were not able to conduct the same refinement for Germany, France and Spain, as only series at current prices are available. Possible deflators, such as the import price indices of energy products, have only been available since 1999 for France, 2000 for Germany and 2005 for Spain, thereby excessively constraining our time-span.

[12] Since the ECB world demand series are available as of 1995Q1 we backcast the series to 1993Q1 by using CPB Netherlands world trade data.

roughly computed as the sum of the estimated contemporaneous and lagged coefficients, would be approximately 0.8.

These results are not confirmed for the remaining countries. In the case of Germany the explained variance is higher in the ULC-based indicator equations relative to the price-based ones; elasticities range between 0.3 and 0.4. Moreover, price-based indicators are statistically insignificant when included in the export equation together with ULC-based ones, according to a pair-wise encompassing test. In France price-based measures are not significant at a 10 per cent confidence level, whereas ULC-based indicators are significant, with elasticities of approximately 0.4.

Spain stands out as an outlier, since export performance appears to be insensitive to both contemporaneous and lagged changes in all price-competitiveness indicators. This finding is consistent with the "Spanish paradox" (see, for example, Cardoso, Correa-Lòpez, Doménech, 2012), according to which over the period 1999-2011 Spain's export market shares remained stable, notwithstanding the deterioration in price competitiveness. Accordingly, non-price competitiveness factors (firm characteristics, market strategy and financial factors) are claimed by the existing literature to have played a key role in driving Spanish exports, thus providing a plausible explanation to the lower fit of our baseline export equation for Spain.

This first piece of evidence therefore suggests that price-competitiveness indicators play a significant role in explaining exports in at least three out of four countries in our sample, with price-based indicators having a greater explanatory power for Italy, as opposed to a stronger role for ULC-based measures in Germany and France. Potential demand contributed positively to export growth in all four countries, as expected; the coefficients linking these two variables are not significantly different from unity (according to Wald coefficient tests), which would suggest stable export market shares of the countries in our sample, barring changes in REERs. Germany presents a marginally greater elasticity of exports to foreign demand, possibly reflecting its stronger manufacturing vocation.[13]

Table 4 provides our baseline import equation results. Owing to the high import content of exports, import growth reacts positively to contemporaneous changes in total exports in all four countries. Whereas elasticities average around 0.4-0.5 in Italy, Germany and France, they are higher for Spain (0.7 approximately). This evidence is consistent with computations in Amador, Cappariello and Stehrer (2013), which point to a higher share of foreign value added in exports since 2000 in Spain relative to the other three countries. Domestic demand also plays a key role in activating imports, yet vary according to the country: elasticities are on average around and just above 2 for Italy, France and Spain, and lower (1.5) for Germany.

On the import side too, the link between REERs and trade performance varies across countries and across indicators. Italian imports react positively to both (lagged) price-based and ULCM-based competitiveness indicators.[14] In Germany and Spain imports are insensitive to REERs, whereas in France they are significantly and positively correlated only to the (lagged) ULCM-deflated measure.

We conducted a wide range of sensitivity analyses on our equations, which confirmed our results were robust to various alterations to our baseline models.

First, we included various additional control variables in our baseline equations. In particular, in the export equation the inclusion of the volume of imports of intermediate goods, as in the European Commission (2010), which we constructed employing Eurostat monthly trade data, does not affect

[13] Since 2000, the year from which disaggregated Spanish value added data are available, the share of manufacturing value added in total economy output has averaged 21.8 per cent in Germany, 17.7 per cent in Italy, 14.8 per cent in Spain and 12.2 per cent in France.

[14] Owing to the instability of the relative coefficient, according to the number and order of lags considered, we employed a three-term moving average of all price-competitiveness indicators for the four countries.

our baseline results, since the variable is found to be insignificant across the board. We also introduced domestic demand in the export equation, which could affect export performance from the supply side, in contrast to foreign demand, which acts on the demand side. This variable is not significant for Italy.[15] It is, however, significant for Germany and Spain across most price-competitiveness specifications, and for France in the case of the two ULC-based indicator specifications. In all of these cases, the sign of the coefficient is negative, pointing to a possible substitution effect between export and domestic demand growth. In the import equation the capacity utilization rate, measured on the basis of quarterly European Commission survey data, is significant only in the case of France, where it drives up imports (as in Allard et al., 2005).

Secondly, an EMU additive dummy taking value 1 as of 1999Q1 (as in Bayoumi et al., 2011) is not significant in any of the specifications, nor are its interactions with the explanatory variables. A crisis dummy taking value 1 as of 2007Q3 is also not significant, nor are its interactions with the independent variables. Limiting the analysis to the 1995Q1-2012Q4 period to net out possible distortions of the 1992 devaluation does not change our results. Moreover, linear trends do not enter significantly into the equations.

Finally, non-price competitiveness factors are not available on a quarterly basis, although their relevance in explaining export dynamics is beyond doubt (in particular in the case of Spain). The lack of non-price indicators would explain why on average the adjusted R-squared measures do not exceed 0.6-0.7 in our exercises. We attempt to tackle this issue in Section 7.

6. PPI-based competitiveness indicators in Italy in the long run

We now set Italy's trade equations in a historical perspective (1980Q1-2013Q1), in order to verify the possible occurrence of structural breaks in the estimated coefficients. Owing to data availability, we were only able to perform this exercise for Italy. In particular, we joined several vintages of quarterly Istat national accounts data in order to obtain a long-run series of merchandise exports and imports as of 1980. Competitiveness indicators deflated by producer prices are also available since then; conversely, alternative price-competitiveness measures are not available over such a long time span.

Figure 7 presents the coefficients of our baseline export equation, estimated via a rolling window procedure, with a bandwidth of 20 years in order to guarantee a sufficient length of each sample. Our findings point to Italy's exports being more reactive to potential demand since the late 1980s. The long-run price elasticity of exports, roughly computed as the sum of the contemporaneous and lagged coefficients of the price-competitiveness indicator, is instead broadly stable over the whole period, presenting no evident signs of shifts. Figure 8 presents the coefficients of our baseline import equation:[16] the sensitiveness of Italy's imports to the PPI-based competitiveness indicator has increased marginally over time.

[15] This result is in line with the empirical findings based on Italian firm-level data in Bugamelli, Gaiotti and Viviano (2014), according to which during the overall period 2001-2012 domestic and foreign sales in Italy were not significantly correlated. However, in the 2001-2007 sub-period the correlation in Bugamelli, Gaiotti and Viviano (2014) is found to be negative, implying binding constraints on production capacity, and in the 2008-2012 period it turns positive, suggesting the relevance of economies of scale or of the presence of credit constraints. Based on our data, domestic demand is confirmed to be insignificant in the two sub-periods 2001-2007 and 2008-2012, but is found to be significant and with a negative sign in the years 1993-2000.

[16] Unlike in our baseline import equation, given the longer time span here, we were not able to net imports of energy products.

7. Readdressing the export equation in our sample of countries

Non-price factors are known to affect a country's export performance alongside price competitiveness. These factors encompass a wide range of determinants, including product quality, technological advantage, industry specialisation, the efficiency of sales networks, the business environment, after-sales services and export firm characteristics. In the existing empirical literature various yearly technological and structural indicators have been employed to measure non-price competitiveness, for example the share of R&D expenditure in GDP, the number of manufacturing patents, the number and cost of contract enforcement procedures, the share of outward and inward FDI in GDP, services TFP contribution to value added growth (see European Commission 2010 and ECB 2012).

In order to capture the effect of quarterly non-price factors in the export equation, we tested for the significance of (relative) total factor productivity (TFP); in the literature, this variable is often employed to proxy the efficiency in the organization of productive factors and, more generally, the efficiency of an economic system in a broader perspective (including the effectiveness of research and innovation). Total economy TFPs were used in our empirical investigation, for two reasons: *a)* in order to control for the quality of productive externalities also in the non-tradable sectors, which weigh on the performance of tradable goods (Barone and Cingano 2011); *b)* in order to moderate the risk of simultaneity bias that would have derived from using manufacturing TFP, which partly drives both ULCMs and PPIs used in the price-competitiveness measures. [17]

We started by linearly interpolating at the quarterly frequency the annual estimates of TFP produced by the European Commission, using a harmonized methodology for all 26 countries included in the ULCM-based REERS, with the exceptions of China and Korea. For Korea we adopted the OECD source, whereas a long time series for China is unavailable so it was dropped from the basket.[18] Under the limitation of a somewhat restricted geographical coverage, in addition to the usual *caveat* regarding the measurement errors affecting the estimates of unobservable TFP, we experimentally built a quarterly relative TFP measure for each of the countries included in our sample. Relative data were obtained by adopting the same methods and weighting schemes used for REER calculations (24 countries considered in our basket; eq. 4).

$$relativeTFP = \prod_{i=1}^{24} \left(\frac{TFP}{TFP_i^{w_i}}\right)^i \tag{4}$$

An increase in relative TFP thus points to an improvement in a country's position with respect to its main trading partners.

Trends in relative TFP for Italy draw an even bleaker picture than absolute TFP. The latter started declining in the early 2000s, as in Spain and unlike in France and Germany (Fig. 9, panel A); since 2007 Italian TFP has roughly followed the same trends as in the other countries with the exception of Spain, where TFP has been increasing since mid-2009, recently reaching its highest level in the period under analysis. By contrast, relative TFP has been declining non-stop since the early 2000s in Italy, marking it as the worst performing among the largest countries in the euro area (Fig. 9, panel B). France's indicator has only slightly deteriorated, whereas for Spain and Germany relative TFP has picked up in recent quarters.

[17] We exclude the ULCT-based price-competitiveness indicators due to the possible simultaneity bias coming from total economy TFP.

[18] For Italy data from the European Commission track our estimates very closely, unlike figures taken from the OECD (which adopt the same deflators of ICT investment as in the US for all countries). We also estimated quarterly TFP based on labour productivity, but we discarded these results owing to the predictably pronounced cyclicality of the series.

Table 5 presents our export equations, which now include the relative TFP indicator as a proxy of non-price competitiveness. We find that the variable enters significantly and with the expected positive sign, independently of the selected REER and across all countries, except for France. In Italy the elasticity of relative TFP is approximately 1, lower than in Germany and, to a much greater extent, in Spain. All other findings are confirmed.

8. Readdressing the import equation in our sample of countries

In order to understand better the link between imports and price-competitiveness indicators, we controlled for changes in the import content of the single components of demand, which reflect the increasing participation of a country in global value chains.

For this purpose, we substitute exports and domestic demand in the baseline import equation with a measure of import-intensity adjusted domestic and external demand (IADD and IAXD, respectively):

(5a) $IADD_t = C_t^{\omega_{C,t}} G_t^{\omega_{G,t}} I_t^{\omega_{I,t}}$

(5b) $IAXD_t = X_t^{\omega_{X,t}}$

(5c) $IAD_t = IADD_t^{\omega_{IADD,t}} IAXD_t^{(1-\omega_{IADD,t})}$

i.e. weighted averages of total investment (I), private consumption (C), government expenditure (G) and exports (X), where the weights ($\omega_{i,t}$) are the import shares for the final demand component identified by *i*. The import share is given by the sum of a direct import component (the share of imported final goods and services per unit of final demand) and an indirect import component (the share of intermediate imported imports per unit of final demand). In Bussière et al (2013), the import-intensity adjusted demand (IAD) is proved to explain imports better than standard aggregate demand (AD) in a panel of 18 OECD countries, both in recessionary and expansionary phases of the cycle. We test whether this result holds in the four countries we consider.

Demand component data are taken from Istat and Eurostat; the import contents are computed on the basis of the OECD Input-Output Database following Bussière et al. (2013). Since I-O tables are available only every five years, we linearly interpolated the weights to obtain quarterly series. For the period after 2005, when the latest vintage was released, we kept the weights fixed. Table 6 presents the average import content of aggregate demand components of the four countries under study over the 1993-2012 horizon. The ranking that emerges is quite intuitive: investment and exports are the most import-intensive components. In the case of the latter variable, this finding partly captures the internationalization of production processes. Government expenditure has a low import content, given that it generally includes goods or services which are not traded internationally.

Figure 10 compares the IAD with a standard measure of AD in the four countries in our sample. The IAD is more volatile, especially during recessions. In all countries and, in particular, in Italy and in Spain the drop in the IAD was significantly sharper than the corresponding fall in the AD in 2008-2009. The Great Trade Collapse of those years is therefore consistent with a strong contraction in domestic IAD, not fully captured by the AD.

Our adjusted import equation, in which we replace the export and domestic demand variables with their import-adjusted counterparts (*iaxd* and *iadd*, respectively), takes the following form:

(6) $$\Delta m_t = \delta_0 + \delta_{1i} \sum_{i=1}^{4} \Delta m_{t-1} + \delta_{2i} \sum_{i=0}^{4} \Delta iaxd_{t-i} + \delta_{3i} \sum_{i=0}^{4} \Delta reer_{t-i} + \delta_{4i} \sum_{i=0}^{4} \Delta iadd_{t-i} + \eta_t$$

Unlike in Bussière et *al.* (2013), whose results refer to a panel of OECD countries, the fit of the import model does not improve for any of the four countries under study (Table 7). We find that the role of exports in explaining imports in Italy increases substantially relative to the baseline model. Conversely, domestic demand elasticities decrease across the sample, albeit remaining higher for France and Spain. The role of price-competitiveness indicators is confirmed to be significant and positive for Italy only.[19]

9. Conclusions

In view of the conflicting signals from alternative price-competitiveness indicators for Italy in the last twenty years, we show that PPIs and ULCMs have actually moved hand in hand since 1992, in contrast to the trends observed in the country's main trading partners. Less pronounced offshoring in Italian manufacturing, and therefore less significant changes in the shares of wages and intermediate inputs on gross output, can explain the broad stability found in the long-run relation between its prices and labour costs. This evidence suggests that the risk of a build-up of cost pressures on Italian firms, which would be forced to progressively squeeze their profit margins in order to keep up with their competitors in a bid to stay on the market, is more limited than suggested by some international commentators.

Next, by testing the alternative price-competitiveness indicators' information content to explain flows of exports and imports of the largest members of the euro area, we find they have a different role across countries. In particular, in Italy ULC-based competitiveness indicators have a significantly smaller impact than price-based ones on export dynamics. This result would confirm that the contribution of the loss of price competitiveness via increasing labour costs to Italy's export performance is likely to be more contained than feared. We also find that non-price competitiveness, proxied by a relative TFP measure, contributes significantly to export growth.

For the other countries under study the results are mixed. All price-competitiveness indicators are significant in explaining German exports. In France only ULC-based measures are statistically significant and none are relevant for Spain ("Spanish paradox"), where the role of relative TFP is particularly important, greater than in Germany, while it is irrelevant in France.

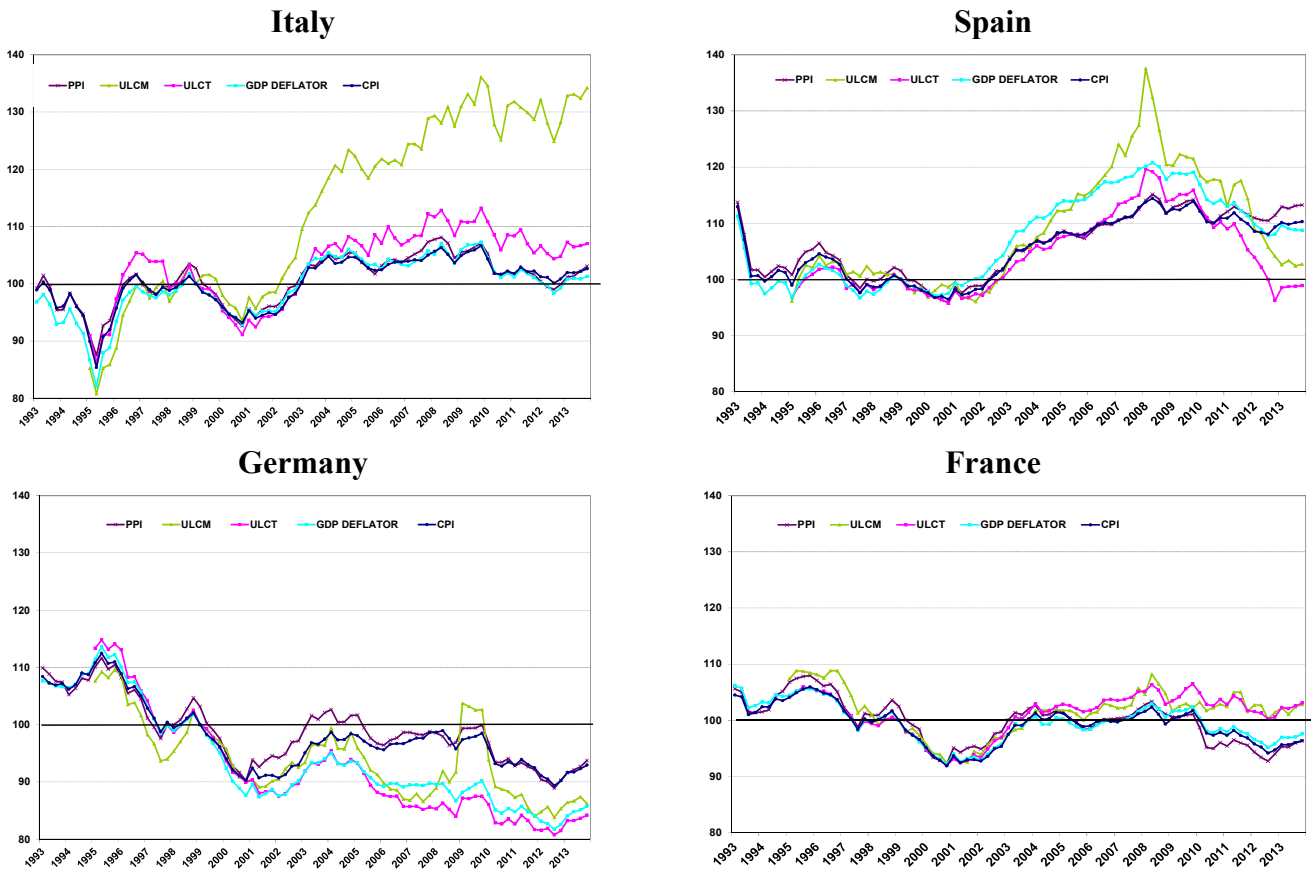
Turning to imports, price-competitiveness indicators prove statistically significant only in the Italian case. Exports and domestic demand are in general more relevant, in line with the existing empirical literature. These findings hold even when we adopt import-intensity adjusted measures of domestic and external demand.

All in all, our results confirm that price and non-price competitiveness significantly affect export performance, to a varying degree across the largest European countries. As for Italy, we find that price-based REERs are better able to explain exports than ULC-based REERs, thus supporting a more cautious reading of the alarming loss in price competitiveness signalled by relative ULCMs. At the same time, the relatively dismal performance in relative TFP appears to call for urgent action to lift the structural barriers restraining the ability of Italian firms to compete in the current environment of intense reorganization of production processes at a global level.

[19] By also including contemporaneous and lagged (up to four) changes in inventories, from an OECD source, as a percentage of GDP, they mostly prove statistically significant, but the elasticities of the other variables do not vary.

Figure 1. Alternative price-competitiveness indicators of the main euro-area countries

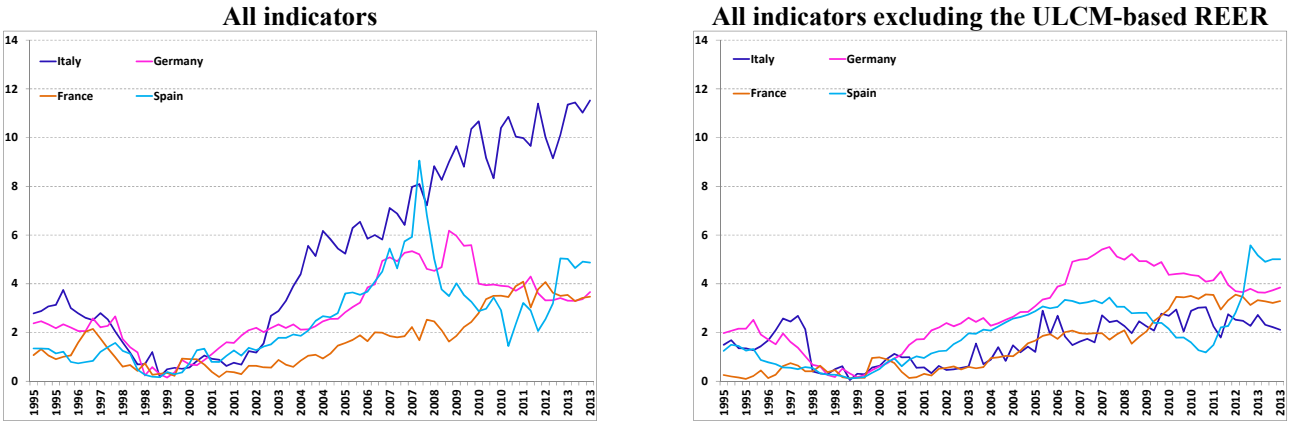
(average quarterly data; indices 1999=100)



Source: ECB and Bank of Italy.

Figure 2. The dispersion of price-competitiveness indicators of the main euro-area countries

(yearly standard deviations computed across the indicators in Fig. 1)



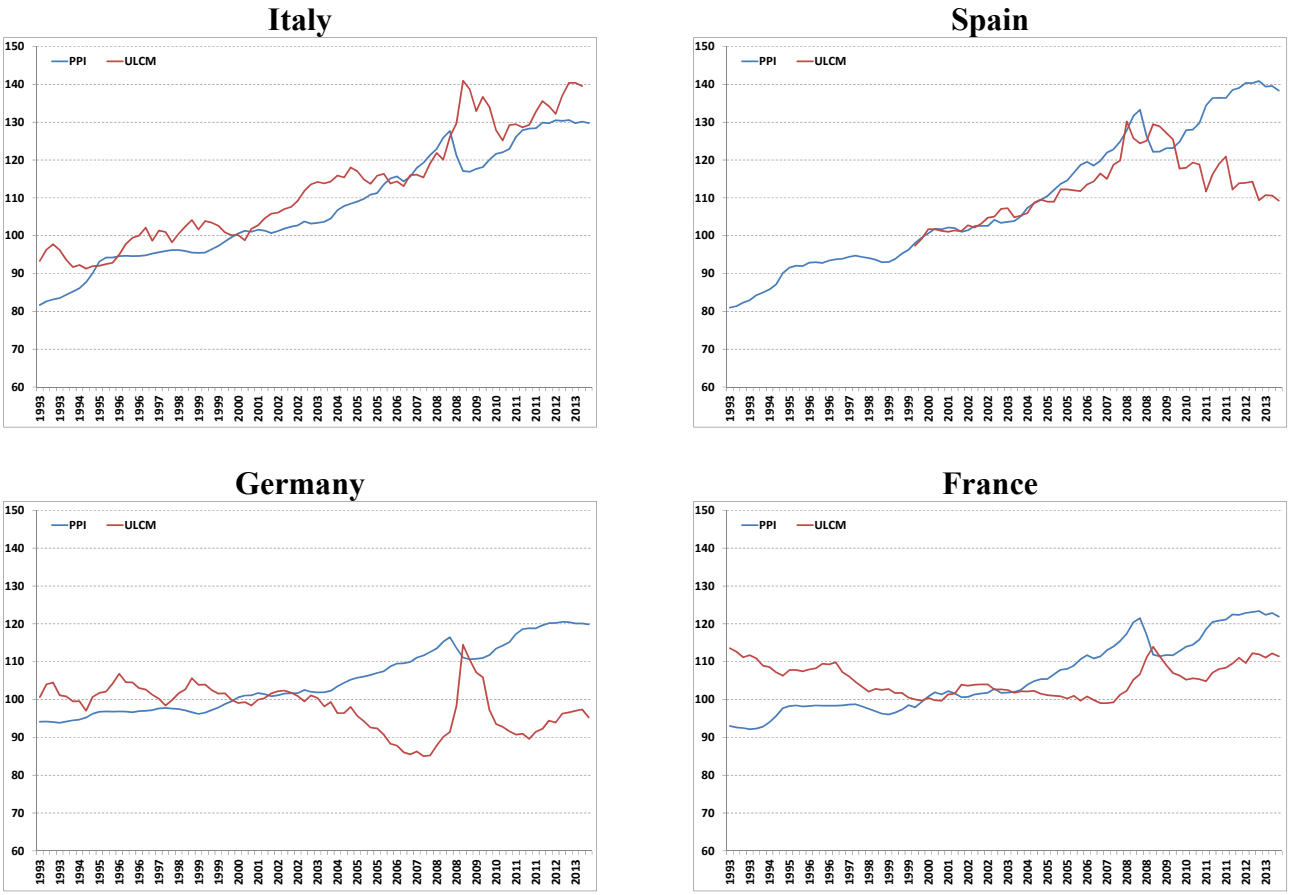
Note: The average standard deviations in the overall period 1995Q1-2012Q4 are: 5.2 for Italy, 2.9 for Germany, 1.7 for France, 2.5 for Spain.
Source: Calculations on ECB and Bank of Italy data.

Note: The average standard deviations in the overall period 1995Q1-2013Q4 are: 1.6 for Italy, 2.8 for Germany, 1.5 for France, 2.0 for Spain.

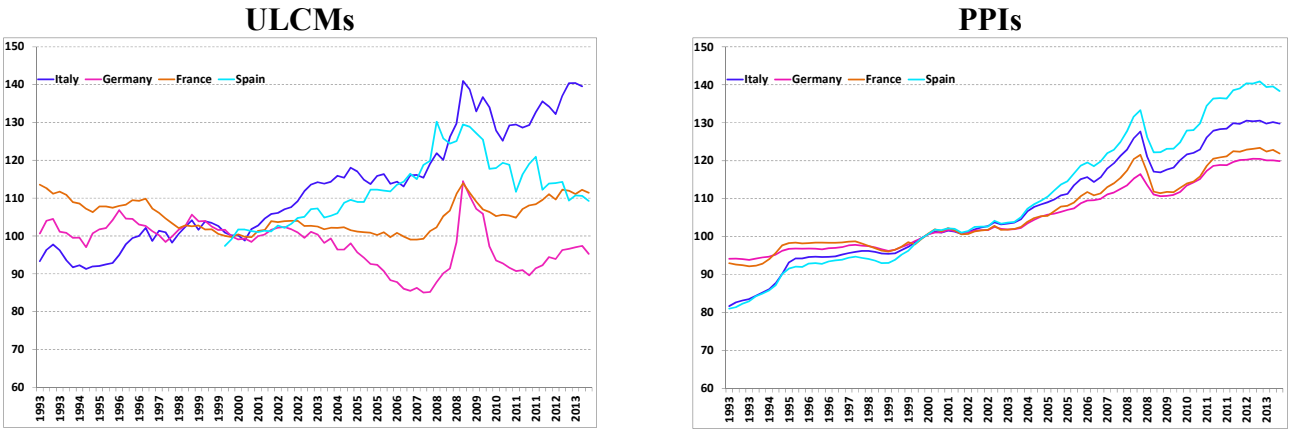
Figure 3. Trends in producer prices and unit labour costs in the manufacturing sector

(average quarterly data; indices 2000=100)

Panel A: within countries



Panel B: across countries



Source: ECB and Bank of Italy.

Figure 4. Cointegration residuals between producer prices and unit labour costs in manufacturing

(FMOLS regression of producer prices on unit labour costs; natural logarithms of indices 2005=100)

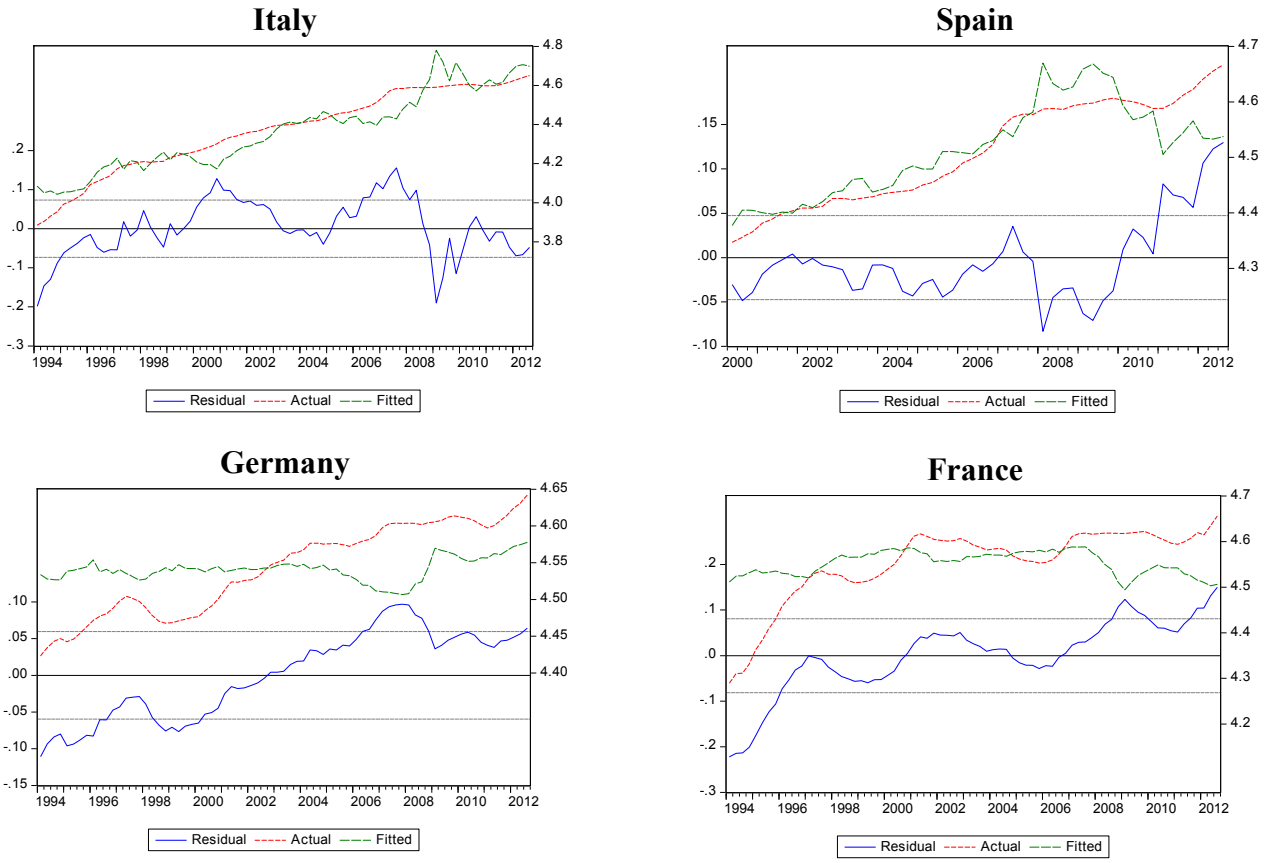


Figure 5. PPI- and ULCM-based price-competitiveness indicators in an artificial world

(average yearly data; indices 2000=100)

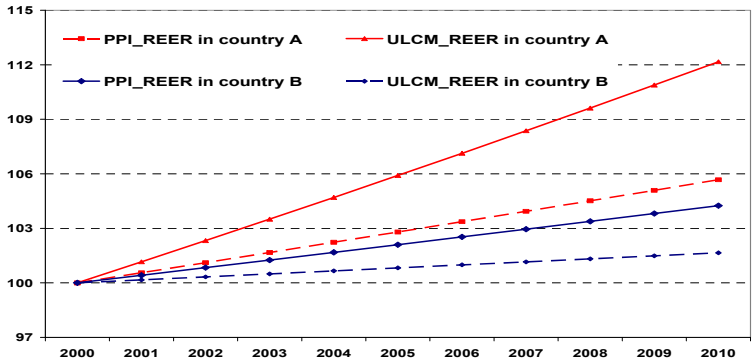
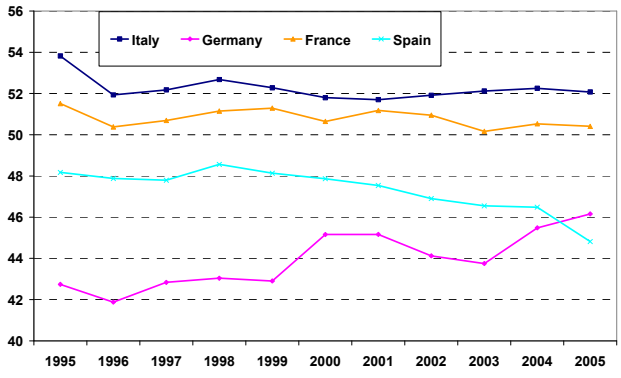


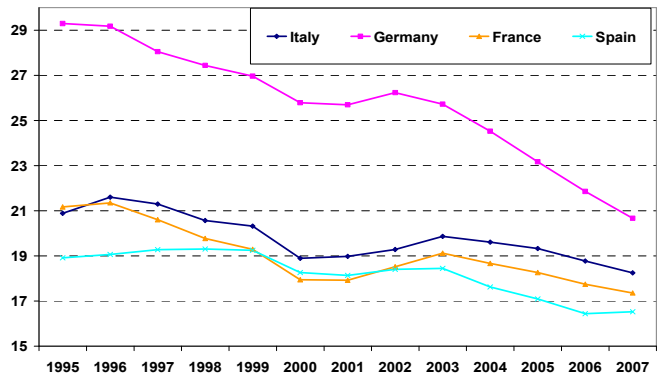
Figure 6. Structural changes in the manufacturing sector

(current prices)

Shares of material intermediate inputs in gross output

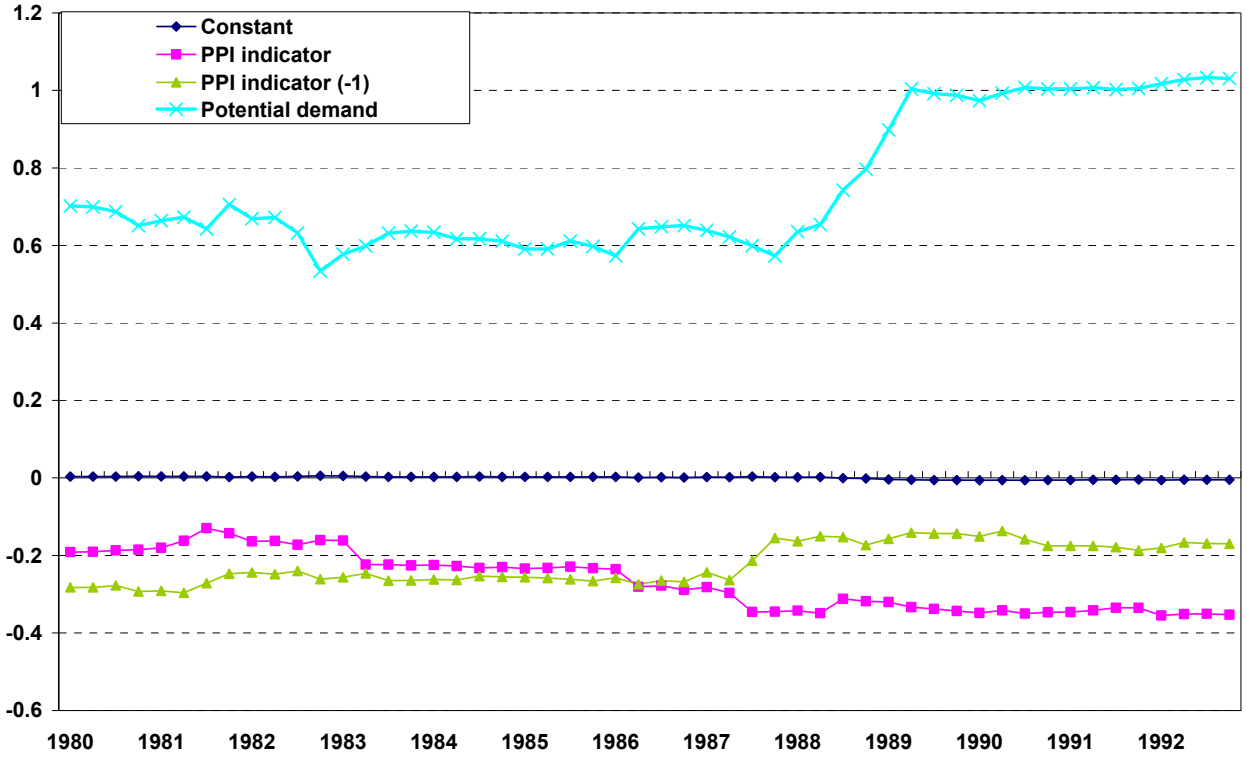


Wage shares (labour compensation on gross output)



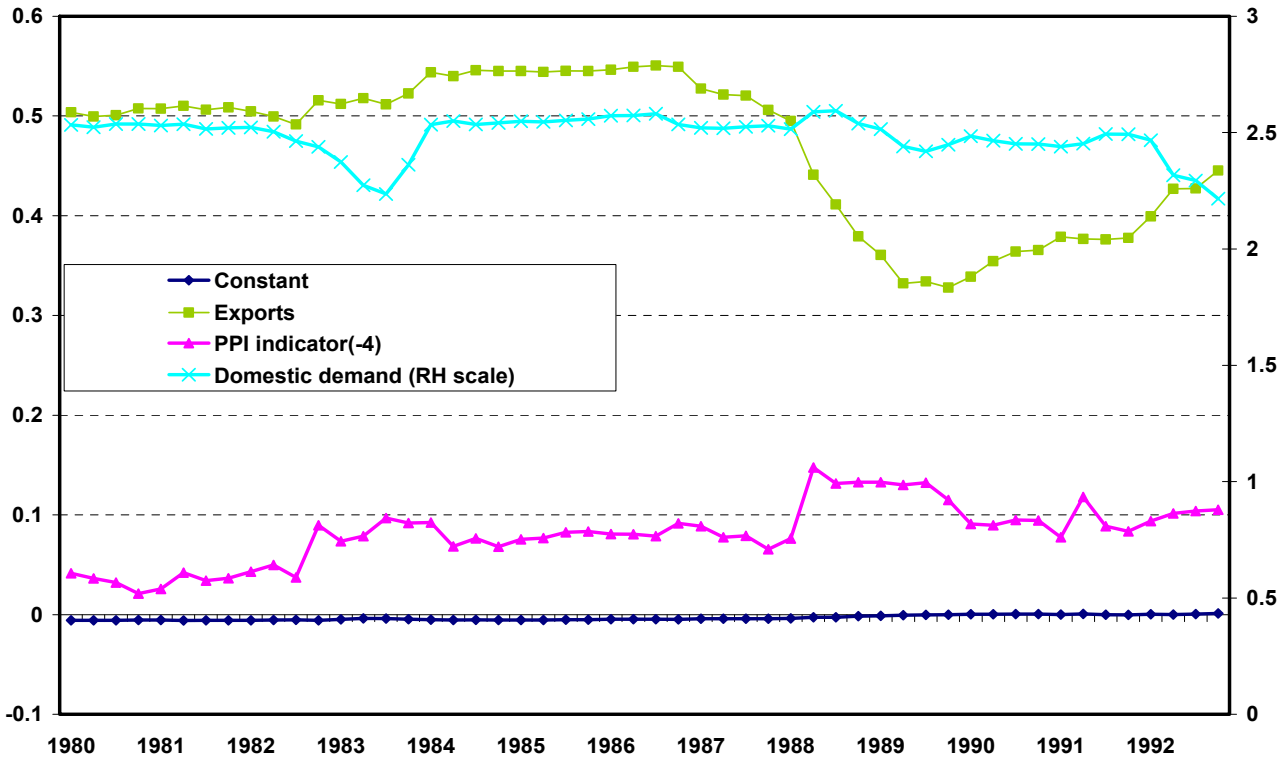
Source: EU-KLEMS data.

Figure 7. Estimating Italy's export equation in the long run



Note: The series are the OLS coefficients of regressions estimated over 20-year windows; the years indicated on the horizontal axis are the starting dates.

Figure 8. Estimating Italy's import equation in the long run

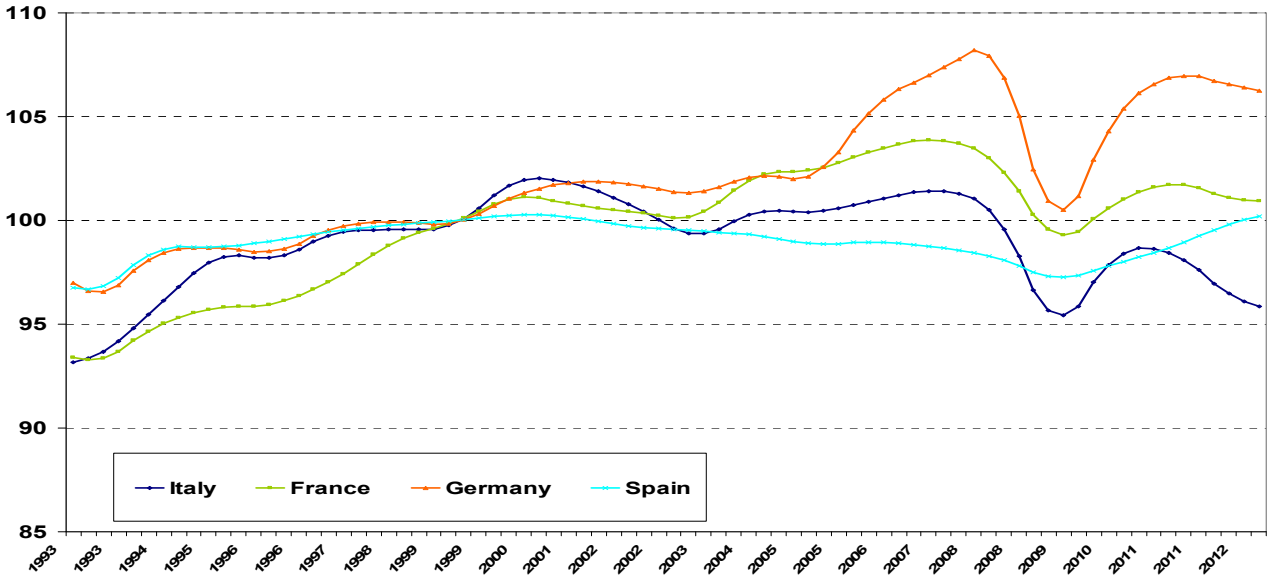


Note: The series are the OLS coefficients of regressions estimated over 20-year windows; the years indicated on the horizontal axis are the starting dates.

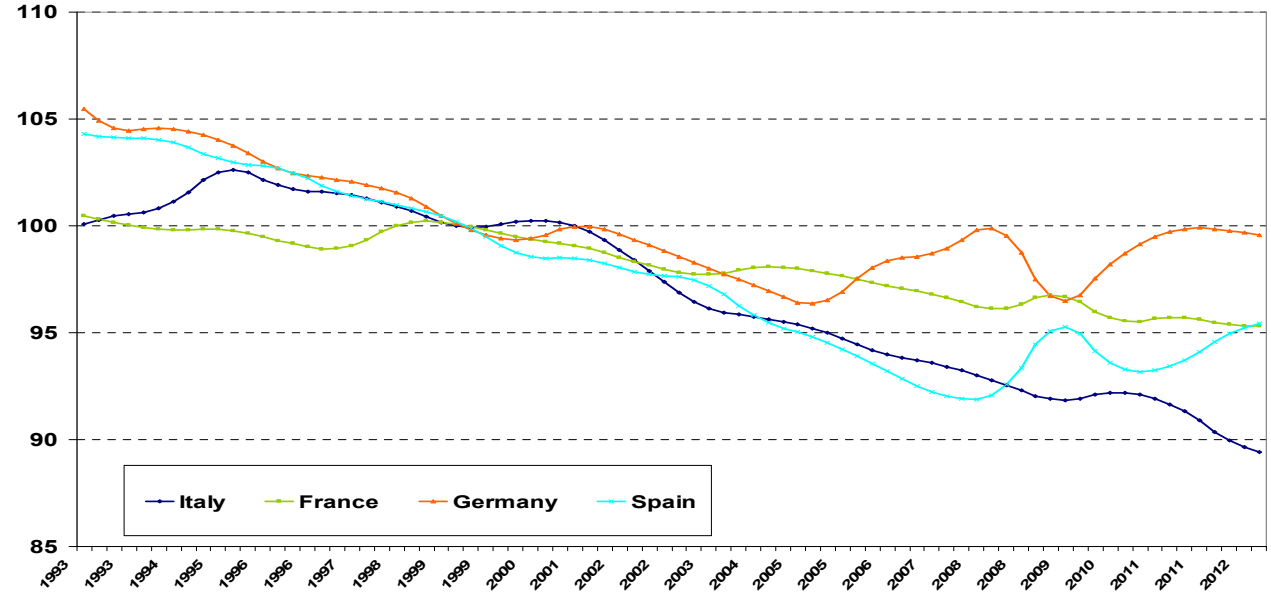
Figure 9. TFP indicators for Italy, France, Germany and Spain

(indices, 1999=100)

Panel A. Absolute TFP



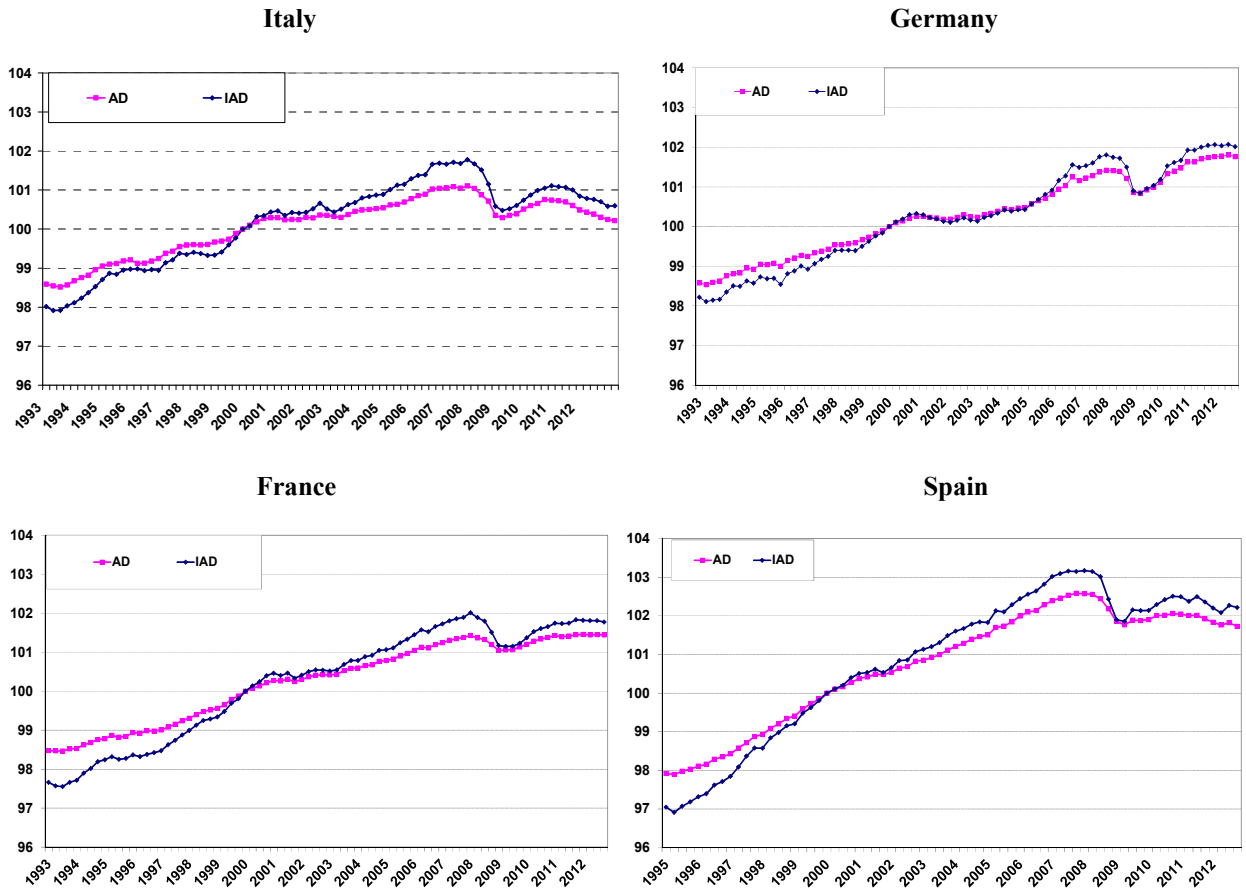
Panel B. Relative TFP



Source: Authors' calculations on European Commission and ECB data.

Figure 10. Aggregate demand (AD) and import intensity-adjusted demand (IAD) in the four largest euro-area economies

(natural logarithms; 2000Q1=100)



Source: Authors' calculations on Eurostat, OECD, Bussière et al. (2013) data.

Table 1. Price-competitiveness trends in the four largest euro-are countries

(percentage points)

	A. ITALY					B. GERMANY				
	PPI	GDP defl.	ULCT	ULCM	CPI	PPI	GDP defl.	ULCT	ULCM	CPI
1999Q1 - 2013Q4	0.3	1.3	7.1	33.9	2.6	-9.4	-14.6	-16.1	-14.1	-7.2
2008Q2 -2013Q4	-5.0	-5.8	-5.9	6.1	-3.8	-4.2	-4.0	-2.2	-5.9	-6.1
2008Q2 -2009Q4	*-1.0*	*0.2*	*0.4*	*7.9*	*0.3*	*2.0*	*0.5*	*1.2*	*10.9*	*-0.5*
2009Q4 -2011Q2	*-4.5*	*-4.9*	*-3.8*	*-5.2*	*-3.8*	*-6.6*	*-4.5*	*-3.4*	*-15.0*	*-4.7*
2011Q2 - 2012Q2	*-3.1*	*-2.8*	*-4.2*	*-2.7*	*-1.8*	*-3.3*	*-3.1*	*-2.3*	*-2.2*	*-3.5*
2012Q2 - 2013Q4	*3.6*	*1.6*	*1.8*	*6.1*	*1.5*	*3.7*	*3.2*	*2.4*	*0.5*	*2.5*

	C. FRANCE					D. SPAIN				
	PPI	GDP defl.	ULCT	ULCM	CPI	PPI	GDP defl.	ULCT	ULCM	CPI
1999Q1 - 2013Q4	-6.1	-2.5	3.1	2.8	-3.7	11.7	8.9	-1.1	2.7	10.4
2008Q2 -2013Q4	-7.0	-5.5	-3.3	-5.5	-6.1	-1.9	-12.1	-20.6	-30.1	-4.2
2008Q2 -2009Q4	*-2.2*	*-0.5*	*0.1*	*-6.1*	*-0.6*	*-1.0*	*-1.7*	*-3.3*	*-11.1*	*-0.5*
2009Q4 -2011Q2	*-4.6*	*-3.6*	*-2.2*	*2.9*	*-3.6*	*-1.2*	*-5.5*	*-6.1*	*-4.7*	*-2.1*
2011Q2 - 2012Q2	*-3.1*	*-2.9*	*-3.1*	*-2.3*	*-3.0*	*-2.4*	*-4.7*	*-7.8*	*-8.8*	*-3.5*
2012Q2 - 2013Q4	*2.9*	*1.5*	*1.8*	*0.1*	*1.2*	*2.7*	*-0.2*	*-3.3*	*-5.6*	*2.0*

Source: ECB and Bank of Italy.

Table 2. Cointegrating regressions

(average quarterly data; natural logarithm of indices 2005Q1=100)

Dependent variable: PPI *Sample: 1994Q1-2012Q3*					
A. Italy			**C. Spain****		
FMOLS estimation			*FMOLS estimation*		
	Coefficient	P-value		Coefficient	P-value
ULCM	1.65	0.000	ULCM	1.08	0.000
*ADF test on residuals**			*ADF test on residuals**		
		P-value			P-value
ADF test statistic		0.019	ADF test statistic		0.837
B. Germany			**D. France**		
FMOLS estimation			*FMOLS estimation*		
	Coefficient	P-value		Coefficient	P-value
ULCM	0.64	0.248	ULCM	-0.69	0.119
*ADF test on residuals**			*ADF test on residuals**		
		P-value			P-value
ADF test statistic		0.682	ADF test statistic		0.118

* Null hypothesis: the residuals have a unit root.

** The sample period for Spain is 2000Q1-2012Q3 due to data availability.

Table 3. The baseline export equation results

(Dependent variable: exports of goods, 1993Q2-2012Q4, log-differences)

	Constant	Potential demand	REER	REER(-4)	*N. observations*	*Adjusted R^2*
A. ITALY						
1. PPI	-0.0055	1.0255	-0.5215	-0.2491		
	(0.0109)	(0.0000)	(0.0000)	(0.0197)	75	0.7204
2. CPI	-0.0054	1.0169	-0.5694	-0.2775		
	(0.0102)	(0.0000)	(0.0000)	(0.0113)	76	0.7284
3. GDPDEFL	-0.0049	0.9972	-0.5101	-0.2430		
	(0.0172)	(0.0000)	(0.0000)	(0.0172)	75	0.7320
4. ULCM	-0.0044	1.0342	-0.2384	-0.1761		
	(0.0550)	(0.0000)	(0.0087)	(0.0318)	68	0.7158
5. ULCT	-0.0062	1.0202	-0.3089	-0.0706		
	(0.0045)	(0.0000)	(0.0034)	(0.4182)	68	0.7081
B. GERMANY						
	Constant	**Potential demand**	**REER**	**REER(-4)**	***N. observations***	***Adjusted R^2***
1. PPI	-0.0003	1.1320	-0.2552	-0.0775		
	(0.8890)	(0.0000)	(0.0506)	(0.5286)	75	0.6656
2. CPI	-0.0010	1.1675	-0.3249	-0.0315		
	(0.6502)	(0.0000)	(0.0296)	(0.8319)	76	0.6710
3. GDPDEFL	-0.0010	1.1574	-0.2601	-0.0315		
	(0.6750)	(0.0000)	(0.0647)	(0.8197)	75	0.6632
4. ULCM	0.0014	1.0417	-0.3698	-0.0203		
	(0.5341)	(0.0000)	(0.0006)	(0.8223)	68	0.7388
5. ULCT	-0.0002	1.1530	-0.3169	0.0804		
	(0.9355)	(0.0000)	(0.0176)	(0.5196)	68	0.7174
C. FRANCE						
	Constant	**Potential demand**	**REER**	**REER(-4)**	***N. observations***	***Adjusted R^2***
1. PPI	-0.0031	0.9894	-0.1628	-0.1530		
	(0.1253)	(0.0000)	(0.2139)	(0.2279)	75	0.6411
2. CPI	-0.0029	0.9913	-0.2248	-0.1410		
	(0.1468)	(0.0000)	(0.1674)	(0.3581)	77	0.6369
3. GDPDEFL	-0.0031	0.9810	-0.2398	-0.1841		
	(0.1319)	(0.0000)	(0.1591)	(0.2455)	75	0.6434
4. ULCM	-0.0029	0.9604	-0.3530	-0.0749		
	(0.1429)	(0.0000)	(0.0098)	(0.5883)	68	0.6570
5. ULCT	-0.0028	0.9451	-0.4028	-0.1570		
	(0.1591)	(0.0000)	(0.0099)	(0.3087)	68	0.6592
D. SPAIN						
	Constant	**Potential demand**	**REER**	**REER(-4)**	***N. observations***	***Adjusted R^2***
1. PPI	-0.0003	1.1585	0.0434	-0.0707		
	(0.6631)	(0.0000)	(0.8760)	(0.8119)	67	0.4129
2. CPI	-0.0008	1.1768	-0.0273	-0.2893		
	(0.8261)	(0.0000)	(0.9288)	(0.3796)	69	0.4147
3. GDPDEFL	0.0012	1.1078	0.1244	-0.1120		
	(0.7520)	(0.0000)	(0.6512)	(0.6771)	71	0.3589
4. ULCM	0.0013	1.1034	0.1580	-0.0422		
	(0.7479)	(0.0000)	(0.3340)	(0.7939)	69	0.3762
5. ULCT	0.0005	1.1569	-0.1417	-0.0591		
	(0.8898)	(0.0000)	(0.5453)	(0.8145)	69	0.3716

Notes: OLS estimates. P-values are reported in brackets.

Table 4. The baseline import equation results

(Dependent variable: imports of goods, 1993Q2-2012Q4, log-differences)

	Constant	Exports	REER(-4)	Domestic demand	*N. observations*	*Adjusted R^2*
A. ITALY						
1. PPI	0.0011	0.5386	0.4580	2.2411		
	(0.5540)	(0.0000)	(0.0579)	(0.0000)	74	0.6530
2. CPI	0.0011	0.5275	0.5430	2.2051		
	(0.5256)	(0.0000)	(0.0188)	(0.0000)	74	0.6613
3. GDPDEFL	0.0010	0.5353	0.4903	2.1797		
	(0.5619)	(0.0000)	(0.0255)	(0.0000)	74	0.6605
4. ULCM	0.0007	0.4449	0.3190	2.4261		
	(0.7487)	(0.0000)	(0.0515)	(0.0000)	66	0.6703
5. ULCT	0.0021	0.4614	0.3181	2.3919		
	(0.3238)	(0.0000)	(0.1257)	(0.0000)	66	0.66817
B. GERMANY						
	Constant	**Exports**	**REER**	**Domestic demand**	***N. observations***	***Adjusted R^2***
1. PPI	0.0037	0.4421	-0.1750	1.4774		
	(0.0584)	(0.0000)	(0.1389)	(0.0000)	79	0.6337
2. CPI	0.0031	0.4650	-0.1996	1.4925		
	(0.1168)	(0.0000)	(0.1491)	(0.0000)	80	0.6366
3. GDPDEFL	0.0033	0.4500	-0.1937	1.4829		
	(0.0890)	(0.0000)	(0.1350)	(0.0000)	79	0.6340
4. ULCM	0.0033	0.4827	-0.0154	1.5090		
	(0.1332)	(0.0000)	(0.8971)	(0.0000)	72	0.6196
5. ULCT	0.0033	0.4991	0.0452	1.5280		
	(0.1255)	(0.0000)	(0.7428)	(0.0000)	72	0.6201
C. FRANCE						
	Constant	**Exports**	**REER(-2)**	**Domestic demand**	***N. observations***	***Adjusted R^2***
1. PPI	-0.0024	0.4489	0.0021	2.2956		
	(0.0998)	(0.0000)	(0.9840)	(0.0000)	77	0.8825
2. CPI	-0.0024	0.4500	0.0318	2.3004		
	(0.0265)	(0.0000)	(0.7958)	(0.0000)	77	0.8826
3. GDPDEFL	-0.0024	0.4493	0.0107	2.2972		
	(0.0264)	(0.0000)	(0.9349)	(0.0000)	77	0.8825
4. ULCM	-0.0026	0.4483	0.2993	2.3822		
	(0.0358)	(0.0000)	(0.0436)	(0.0000)	69	0.8928
5. ULCT	-0.0022	0.4390	0.0303	2.2738		
	(0.1241)	(0.0000)	(0.8371)	(0.0000)	69	0.8832
D. SPAIN						
	Constant	**Exports**	**REER**	**Domestic demand**	***N. observations***	***Adjusted R^2***
1. PPI	-0.0092	0.7273	-0.0651	2.0721		
	(0.0001)	(0.0000)	(0.7181)	(0.0000)	71	0.8393
2. CPI	-0.0087	0.7439	-0.0467	2.0263		
	(0.0001)	(0.0000)	(0.8177)	(0.0000)	73	0.8396
3. GDPDEFL	-0.0093	0.7278	-0.0359	2.0768		
	(0.0000)	(0.0000)	(0.8391)	(0.0000)	71	0.8391
4. ULCM	-0.0090	0.7539	-0.0884	2.0529		
	(0.0001)	(0.0000)	(0.3485)	(0.0000)	73	0.8415
5. ULCT	-0.0089	0.7425	-0.0925	2.0604		
	(0.0001)	(0.0000)	(0.5188)	(0.0000)	73	0.8405

Notes: OLS estimates. P-values are reported in brackets.

Table 5. The augmented export equation results

(Dependent variable: exports of goods, 1993Q2-2012Q4, log-differences)

	Constant	Potential demand	REER	REER(-4)	Relative TFP(-4)	*N. observations*	*Adjusted R^2*
A. ITALY							
1. PPI	-0.0046	1.0326	-0.5309	-0.2049	1.0436		
	(0.0255)	(0.0000)	(0.0000)	(0.0957)	(0.1031)	75	0.7322
2. CPI	-0.0041	1.0190	-0.5715	-0.2208	1.0114		
	(0.0639)	(0.0000)	(0.0000)	(0.0404)	(0.0915)	76	0.7296
3. GDPDEFL	-0.0036	0.9985	-0.5167	-0.1931	1.0162		
	(0.0962)	(0.0000)	(0.0000)	(0.0640)	(0.0960)	75	0.7330
4. ULCM	-0.0022	1.0350	-0.2264	-0.1515	1.2897		
	(0.4642)	(0.0000)	(0.0100)	(0.0413)	(0.1938)	68	0.7172
B. GERMANY							
	Constant	**Potential demand**	**REER**	**REER(-4)**	**Relative TFP**	***N. observations***	***Adjusted R^2***
1. PPI	0.0022	1.0162	-0.2419	-0.0275	1.3535		
	(0.3605)	(0.0000)	(0.0049)	(0.8193)	(0.0126)	75	0.6809
2. CPI	0.0018	1.0425	-0.3023	0.0097	1.4051		
	(0.4779)	(0.0000)	(0.0020)	(0.9478)	(0.0110)	76	0.6842
3. GDPDEFL	0.0017	1.0395	-0.2396	0.0275	1.3806		
	(0.4786)	(0.0000)	(0.0173)	(0.8320)	(0.0109)	75	0.6792
4. ULCM	0.0032	0.9600	-0.3401	0.0071	1.0007		
	(0.1014)	(0.0000)	(0.0002)	(0.9370)	(0.0533)	68	0.7430
C. FRANCE							
	Constant	**Potential demand**	**REER**	**REER(-4)**	**Relative TFP**	***N. observations***	***Adjusted R^2***
1. PPI	-0.0029	1.0087	-0.1723	-0.1419	0.7453		
	(0.0736)	(0.0000)	(0.1064)	(0.2210)	(0.4575)	75	0.6379
2. CPI	-0.0036	1.0026	-0.2551	-0.1225	-0.8031		
	(0.0424)	(0.0000)	(0.0824)	(0.3728)	(0.3752)	77	0.6340
3. GDPDEFL	-0.0028	1.0001	-0.1723	-0.1419	0.7429		
	(0.0810)	(0.0000)	(0.1064)	(0.2210)	(0.4441)	75	0.6402
4. ULCM	-0.0034	0.9707	-0.3647	-0.0799	-0.5665		
	(0.0703)	(0.0000)	(0.0035)	(0.57524)	(0.5230)	68	0.6529
D. SPAIN							
	Constant	**Potential demand**	**REER**	**REER(-4)**	**Relative TFP(-1)**	***N. observations***	***Adjusted R^2***
1. PPI	0.0002	1.4820	0.1452	0.0325	2.9865		
	(0.9607)	(0.0000)	(0.7064)	(0.9068)	(0.064)	67	0.3975
2. CPI	-0.0008	1.5108	0.0442	0.2297	2.9680		
	(0.8354)	(0.0000)	(0.9068)	(0.3693)	(0.0599)	69	0.3979
3. GDPDEFL	-0.0001	1.5071	0.2509	0.0234	3.1645		
	(0.9793)	(0.0000)	(0.4829)	(0.9206)	(0.0587)	71	0.4035
4. ULCM	-0.0002	1.6373	0.1697	0.1806	3.8050		
	(0.6466)	(0.0000)	(0.3132)	(0.2000)	(0.0318)	69	0.4456

Notes: OLS estimates. P-values are reported in brackets.

Table 6. The import content of demand components in Italy, Germany, France and Spain
(1993Q1-2012Q4 averages)

	G	C	I	X
Italy	0.08	0.25	0.34	0.33
Germany	0.10	0.26	0.35	0.30
France	0.10	0.27	0.32	0.31
Spain	0.11	0.24	0.31	0.34

Source: Authors' calculations on data provided in Bussière et al. (2013).
Notes: The import contents have been normalised to sum to unity.
Legend: G= Government expenditure; C = private consumption;
I=investment; X= exports.

Table 7. The adjusted import equation results

(Dependent variable: imports of goods, 1993Q2-2012Q4, log-differences)

	Constant	Import-Adjusted Exports	REER(-4)	Import-Adjusted Domestic demand	*N. observations*	*Adjusted R^2*
A. ITALY						
1. PPI	-0.0055	1.1340	0.4095	0.6744		
	(0.1722)	(0.0004)	(0.0961)	(0.0732)	75	0.3832
2. CPI	-0.0055	1.1283	0.5711	0.6459		
	(0.1626)	(0.0003)	(0.0184)	(0.0804)	74	0.4070
3. GDPDEFL	-0.0055	1.1211	0.4758	0.6428		
	(0.1652)	(0.0004)	(0.0321)	(0.0002)	75	0.3990
4. ULCM	-0.0086	1.3957	0.2886	0.6210		
	(0.014)	(0.0000)	(0.1248)	(0.0486)	66	0.5178
5. ULCT	-0.0075	1.4484	0.1962	0.5675		
	(0.0294)	(0.0000)	(0.3253)	(0.0713)	66	0.5068
B. GERMANY						
	Constant	**Import-Adjusted Exports**	**REER(-4)**	**Import-Adjusted Domestic demand**	***N. observations***	***Adjusted R^2***
1. PPI	0.0055	0.4929	0.0177	0.6945		
	(0.1413)	(0.0054)	(0.9425)	(0.0001)	73	0.2392
2. CPI	0.0053	0.4913	-0.0717	0.6918		
	(0.1480)	(0.0055)	(0.8112)	(0.0011)	73	0.2390
3. GDPDEFL	0.0053	0.4943	-0.0246	0.6938		
	(0.1582)	(0.0052)	(0.9260)	(0.0010)	73	0.2394
4. ULCM	0.0058	0.5586	0.1396	0.8541		
	(0.1218)	(0.0040)	(0.4931)	(0.0009)	68	0.2908
5. ULCT	0.0063	0.5671	0.1913	0.8521		
	(0.1052)	(0.0036)	(0.4938)	(0.0009)	68	0.2908
C. FRANCE						
	Constant	**Import-Adjusted Exports**	**REER(-2)**	**Import-Adjusted Domestic demand**	***N. observations***	***Adjusted R^2***
1. PPI	-0.0003	0.2460	-0.0061	1.6792		
	(0.9027)	(0.0459)	(0.9775)	(0.0000)	73	0.4336
2. CPI	-0.0003	0.2448	0.0241	1.6851		
	(0.9064)	(0.0450)	(0.9294)	(0.0000)	73	0.4337
3. GDPDEFL	-0.0003	0.2456	-0.0163	1.6780		
	(0.9036)	(0.0440)	(0.9548)	(0.0000)	73	0.4337
4. ULCM	-0.0006	0.4025	0.3291	1.5836		
	(0.8019)	(0.0034)	(0.2301)	(0.0000)	68	0.5027
5. ULCT	-0.0003	0.3853	0.2564	1.5338		
	(0.8949)	(0.0046)	(0.3581)	(0.0000)	68	0.4979
D. SPAIN						
	Constant	**Import-Adjusted Exports**	**REER(-4)**	**Import-Adjusted Domestic demand**	***N. observations***	***Adjusted R^2***
1. PPI	-0.0066	0.6380	0.0405	1.6721		
	(0.0718)	(0.0001)	(0.8827)	(0.0000)	71	0.6373
2. CPI	-0.0066	0.6357	0.0199	1.6734		
	(0.0742)	(0.0001)	(0.9479)	(0.0000)	73	0.6372
3. GDPDEFL	-0.0064	0.6295	-0.0427	1.6864		
	(0.0789)	(0.0001)	(0.8733)	(0.0000)	71	0.6376
4. ULCM	-0.0065	0.6336	0.0867	1.6503		
	(0.0711)	(0.0000)	(0.5320)	(0.0000)	73	0.6393
5. ULCT	-0.0065	0.6339	-0.0009	1.6760		
	(0.0714)	(0.0000)	(0.9969)	(0.0000)	73	0.6372

Notes: OLS estimates. P-values are reported in brackets.

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