

## COMPETITIVENESS INDICATORS: THE IMPORTANCE OF AN EFFICIENT ALLOCATION OF RESOURCES

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### Introduction

Given the nature of the current crisis and the levels of public and private-sector debt, which limit the capacity to reactivate the economy by stimulating domestic demand, competitiveness gains have become a crucial resource for relaunching growth in a significant number of economies. In addition, in the context of Economic and Monetary Union, competitiveness plays a central role as a macroeconomic adjustment variable and, thus, in the stability of the euro area. However, there is no common agreed definition of competitiveness and the term is used with different shades of meaning depending on the context. For example, in macroeconomics textbooks the concept of competitiveness is similar to that of relative prices between countries. In Porter (1990) it is defined as the productiveness with which a nation uses its resources, whether natural or accumulable (capital and labour), which is close to the definition of the Davos Forum, according to which competitiveness has to do with the set of institutions, policies and factors that determine a nation's level of productivity. The OECD considers it to be a country's ability to sell its products on international markets, while Krugman (1994) refers to it as "a poetic way of saying productivity", and warns of the dangers of an obsession with the competitiveness of a country. The European Commission also has its own definition of this concept, perhaps the broadest and most abstract, which associates improvements in competitiveness with increases in living standards accompanied by the lowest possible level of involuntary unemployment.

Many of these definitions of competitiveness have some connection with a country's relative position in international trade, which depends in principle on price and cost factors. If these move unfavourably relative to those of other economies, the ability to sell products at home and abroad is impaired. This probably explains why competitiveness indicators based on relative (national or sectoral) price comparisons are among those used most regularly. But there are also other factors that affect the ability of a country to sell its output, such as, for example, the quality of the products and the economy's productive specialisation. The composition of a country's human capital, the efficiency of its infrastructure, its business regulatory framework, the integration of its firms into global production chains and their innovative capacity are factors that have a decisive influence on these determinants of competitiveness and that are not satisfactorily reflected in the usual price-competitiveness indicators. Also, most of the empirical approximations to the concept of competitiveness adopt an aggregate approach (rarely descending below the sector level), which does not necessarily permit all the problems underlying a loss of competitiveness to be identified.

This article reviews the usual measures of competitiveness and their limitations, when all the relevant information is aggregated, and discusses alternative indicators, based on microeconomic information (at the firm level), which enable certain distortions that prevent resources from being efficiently allocated between firms and sectors of the economy to be identified.

### The usual competitiveness indicators

The measurement of competitiveness usually concentrates on indicators of relative prices and costs, partly due to the difficulties of measuring other factors and partly because: i) these indicators are readily calculated using data available for most countries; ii) they are

available with a high frequency, which makes them especially attractive for short-term analysis, and iii) they facilitate the diagnosis of crucial elements in the discussion of macroeconomic imbalances, principally the current account deficit.

Relative inflation developments between countries are one example of these price-competitiveness indicators. Among other problems, however, it should be noted that general price indices include the prices of non-tradable products. A frequently used alternative is provided by relative export price developments. However this alternative is also unsatisfactory as it fails to capture developments in those goods which, despite being tradable, are not actually exported as they are not sufficiently competitive. This problem could in principle be resolved by using the prices of tradable goods, irrespective of whether or not they are traded.

Traditionally, cost-competitiveness has been measured using relative wage developments (with all the sectoral variants discussed previously) or relative developments in unit labour costs (ULCs), which measure the labour cost per unit of output, whether in real or nominal units.<sup>1</sup> One drawback of these measures is that a simple comparison of the price or cost developments in two countries does not give any information about competitiveness if these countries produce different goods and sell them in different markets. It is for this reason that real effective exchange rates are also constructed. These provide an indicator of relative price or cost developments that takes into account which are a country's most important export destinations (i.e. the developments are weighted in accordance with these elements), as well as the exchange rate developments in these destinations. However, even then they still only capture just one of the important elements underlying the concept of competitiveness and are exposed to problems of interpretation such as those associated with the so-called Balassa-Samuelson effect, whereby productivity increases in the tradable sector are transmitted to the economy's total wage costs.

With so many limitations it is not surprising that, as the world economy has become more complex, the ability of price/cost indicators to explain export behaviour has declined. For example (see Table 1), it is estimated<sup>2</sup> that, although there is a long-term relationship between relative-price-based competitiveness indicators and exports, the real exchange rate in most cases explains well below 10% of the variance in exports, that world trade developments are the variable that best explains export developments (about 80%), and that the other 15% is determined by other unknown factors that are reflected in this estimation in the past behaviour of exports themselves.<sup>3</sup>

Another, closer, illustration of the limited predictive power of price/cost competitiveness indicators is what has come to be colloquially called "the Spanish competitiveness paradox",

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1 An implicit assumption when using these labour-cost based measures is that the level of capital is given in the short term and that the cost of capital is equalised across borders, given that it is a mobile factor, so that the cost of capital should not differ between similar countries. This assumption may also amount to a limitation for these measures; see Felipe and Kumar (2011).

2 This estimation is based on an error correction mechanism using a sample of ten countries for the period 1995 Q1-2011 Q3, in which the exports of each country are a function of the volume of world exports (general world trade developments) and its relative price/cost competitiveness. Three alternative measures of competitiveness are used, all of which are supplied by the European Commission, namely the real exchange rate calculated using ULCs (measure 1), manufacturing wages (measure 2) and the GDP deflator (model 3). The results are summarised in Table 1. The type of identification imposed is the Cholesky one, under which world exports and the real exchange rate affect exports contemporaneously.

3 This absence of a significant relation is even found in auto-regressive models that exclude world trade developments.

	World trade volume	Real exchange rate	Lagged exports
<b>SPAIN</b>			
ULC-based exchange rate	87.7	1.6	10.7
Manufacturing wage-based exchange rate	85.5	4.1	10.4
GDP deflator-based exchange rate	92.0	0.8	7.2
<b>FRANCE</b>			
ULC-based exchange rate	87.0	6.8	6.2
Manufacturing wage-based exchange rate	87.4	4.5	8.1
GDP deflator-based exchange rate	83.6	8.2	8.2
<b>UNITED KINGDOM</b>			
ULC-based exchange rate	58.3	2.1	39.5
Manufacturing wage-based exchange rate	55.4	1.8	42.8
GDP deflator-based exchange rate	59.8	1.2	39.0
<b>UNITED STATES</b>			
ULC-based exchange rate	84.8	9.0	6.2
Manufacturing wage-based exchange rate	81.7	10.2	8.1
GDP deflator-based exchange rate	81.2	13.8	5.0
<b>GERMANY</b>			
ULC-based exchange rate	87.0	1.1	11.9
Manufacturing wage-based exchange rate	83.8	5.9	10.3
GDP deflator-based exchange rate	89.5	0.2	10.3
<b>ITALY</b>			
ULC-based exchange rate	86.9	0.3	12.8
Manufacturing wage-based exchange rate	88.3	0.2	11.5
GDP deflator-based exchange rate	91.1	1.3	7.7
<b>PORTUGAL</b>			
ULC-based exchange rate	89.1	0.7	10.2
Manufacturing wage-based exchange rate	87.6	0.8	11.6
GDP deflator-based exchange rate	89.1	0.8	10.1
<b>GREECE</b>			
ULC-based exchange rate	76.9	1.6	21.5
Manufacturing wage-based exchange rate	67.3	20.8	11.9
GDP deflator-based exchange rate	72.0	7.7	20.3
<b>JAPAN</b>			
ULC-based exchange rate	79.0	3.7	17.4
Manufacturing wage-based exchange rate	78.5	4.4	17.1
GDP deflator-based exchange rate	87.4	4.0	8.6
<b>IRELAND</b>			
ULC-based exchange rate	52.5	23.8	23.6
Manufacturing wage-based exchange rate	54.7	7.6	37.7
GDP deflator-based exchange rate	60.5	3.1	36.4
<b>AVERAGE</b>			
ULC-based exchange rate	78.9	5.1	16.0
Manufacturing wage-based exchange rate	77.0	6.0	16.9
GDP deflator-based exchange rate	80.6	4.1	15.3

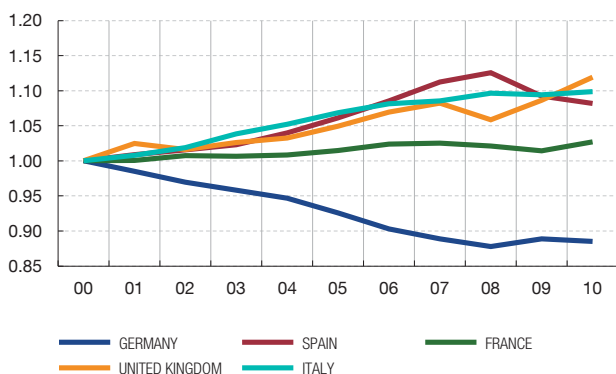
SOURCE: Banco de España.

a The variables considered are the world trade volume as measured by exports, the real exchange rate and the logarithm of exports.

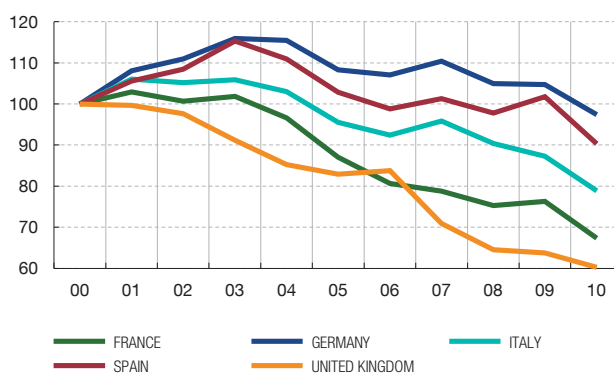
which is illustrated in panels 1 and 2 of Chart 1. On the one hand, it is found that, during the decade starting in 2000, ULCs in Spain grew more quickly than in the main developed economies; on the other hand, Spain's export shares did not fall by as much as those of the main developed economies, with the sole exception of Germany.

However, using world export market shares as the main indicator of competitiveness is not a definitive solution either, since these shares are affected by other factors, such as the geographical location, size, sectoral specialisation, integration into production chains and effi-

1 COMPETITIVENESS INDICATORS VIS-À-VIS THE EURO AREA (a)



2 MARKET SHARE INDEX (b)



SOURCES: ECB and WTO.

- a An increase in the index implies a loss of competitiveness.  
 b An increase in the index implies a gain of market share.

ciency of the imports of the country in question. Some authors (e.g. Krugman (1994)) criticise the emphasis on international market shares as competitiveness indicators, insofar as they give an overly mercantilist view and cannot say anything about the competitiveness of the nation as a whole, but only of its exports.

One option followed in the literature consists in modifying the aggregated sectoral price/cost measures so that they better capture non-price elements of competitiveness. A promising example of this approach, albeit still incapable of capturing all the relevant factors, is the one that appears in Bennett et al. (2009). These authors argue that non-price elements of competitiveness should be reflected in the elasticity of substitution of each product. Accordingly, they construct real exchange rates which allow such elasticity to differ from product to product.

Finally, it should also be pointed out that there are a number of indicators that attempt to measure the institutional characteristics of each country that may influence competitiveness. This is the case, for example, of the Davos World Economic Forum's *Global Competitiveness Report* and of the World Bank's *Doing Business Report*. In general, these indicators are constructed by conducting surveys of various experts of each country on the ease of doing business in their country, which are sometimes supplemented with macroeconomic indicators. This is a very valuable alternative that provides useful information, since it enables areas to be identified in which some countries are clearly lagging. That said, the information is subjective, there is sometimes a lack of robust empirical links between the variables analysed and competitiveness, and it is impossible to draw quantitative conclusions to guide economic policy.

Given this wide range of alternative measures of competitiveness and the limitations of each, it is not surprising that, for the purposes of the alert mechanism in the context of macroeconomic surveillance and the excessive imbalances procedure recently launched at the European level, it has been decided to monitor the developments in a broad set of competitiveness measures. These measures include the current account balance, ULCs, export shares and CPI-deflated real exchange rates.

Panel A: Extensive margin of exports, by country and company size.

Size (b)	Austria	France	Germany	Hungary	Italy	Spain	United Kingdom
10-19	69.8	44.7	45.7	58.0	65.4	51.2	54.9
20-49	63.8	59.1	65.4	64.7	73.3	63.5	62.8
50-249	88.6	75.4	78.2	79.3	86.6	76.2	76.8
Over 249	90.8	87.6	84.0	97.4	92.6	88.0	80.7
<b>Total</b>	<b>72.6</b>	<b>57.9</b>	<b>63.4</b>	<b>67.3</b>	<b>72.2</b>	<b>61.1</b>	<b>61.0</b>

Panel B: Intensive margin of exports, by country and company size.

Size (b)	Austria	France	Germany	Hungary	Italy	Spain	United Kingdom
10-19	26.2	23.0	25.9	30.2	30.4	21.4	26.2
20-49	33.3	27.0	28.1	43.6	34.2	24.5	27.8
50-249	55.9	33.0	33.9	53.2	42.2	33.3	33.2
Over 249	64.7	41.2	37.8	66.6	52.6	40.6	34.2
<b>Total</b>	<b>40.4</b>	<b>28.5</b>	<b>30.0</b>	<b>44.8</b>	<b>34.6</b>	<b>25.9</b>	<b>29.1</b>

SOURCE: Barba-Navaretti et al. (2011).

a Data are shown as percentages.

b Company size refers to the number of employees.

### The importance of firm heterogeneity for the measurement of competitiveness

When measuring a nation's competitiveness, the indicators described in the previous section do not adequately capture the role of firms and their heterogeneity. Table 2 illustrates why an adequate measure of competitiveness should take this heterogeneity into account. Panel A shows, for each country in the EFIGE database,<sup>4</sup> the probability that a firm exports (the extensive margin) according to its size, while Panel B shows the percentage of production that each firm exports (the intensive margin). One can see that for firms that are similar in size but located in different countries, the probability that they export and the proportion of production exported (in the case of firms that do export) are similar. In other words, differences in exports aggregated by size, by sector or by country have little to do with differences between firms with similar characteristics and basically stem from differences in the distribution of factors of production across sectors and differences in the firm size distribution within each sector. For example, Barba Navaretti et al. (2011) estimate that, if Spain had the industrial structure and firm size distribution of Germany, Spanish exports would be around 25% higher.

Another example of the importance of obtaining an adequate firm breakdown is offered by the work of Antrás et al. (2010), who show how, when ULC developments are considered at the firm level, instead of at the aggregate economy level, Spain's experience is less paradoxical. Thus, the ULCs of the largest firms have behaved best over the last decade and, in turn, their exports have grown by more than those of other firms. The different relative weights of these firms in aggregate ULCs and in total exports may, therefore, help

<sup>4</sup> The EFIGE project, *European Firms in a Global Economy: internal policies for external competitiveness*, is a project led by Bruegel that has various European universities, research centres, central banks and international agencies as partners. One of the main tasks of this project has been to design, construct and implement a database based on a survey, this being the first database to provide detailed and comparable information for seven European countries, i.e. Germany, Austria, France, Hungary, Italy, Spain and the United Kingdom, on the characteristics of their manufacturing firms, with an important emphasis on internationalisation activities. For more details, see: [www.efige.org](http://www.efige.org).

explain what was referred to above as the “Spanish paradox”. An adequate measure of competitiveness should be capable of capturing these elements.

To understand the reason for this high degree of heterogeneity across firms the concept of productivity is essential (see Porter (2005)). Productivity allows an economy to have high wages and capital returns. The productivity of a firm, irrespective of its propensity to export, depends on its organisation and the legal and regulatory framework within which it operates. The recent literature on industrial organisation and international trade has provided abundant empirical evidence to support the idea that the path of macroeconomic aggregates depends largely on the decisions and characteristics of firms and, in particular, on the behaviour and productivity of a sub-set of them, i.e. those firms with the highest productivity. This is clear in the case of exporting firms. It is normal to find as much heterogeneity among the firms belonging to a single sector as between firms belonging to different sectors. Moreover, the exporting firms of one sector (and country) are a minority (those that perform best in terms of productivity, size, innovation, etc.). This superior performance exists before these firms export, i.e. exporting is the effect and not the cause of the competitiveness of a particular firm.<sup>5</sup>

But also, still controlling by sector, within any one sector those firms with extreme productivity levels have a high weight (following a pattern more similar to the Pareto than the normal distribution), which means that the behaviour of the sector aggregates are strongly influenced by the behaviour of the largest and most productive firms (Di Giovanni and Levchenko (2009)). This not only distorts the measures of competitiveness, but also their dynamic behaviour, since the empirical evidence shows that firms react differently to different shocks according to their size and productivity (see, for example, Altomonte et al. (2010)).

The results in Antrás et al. (2010) suggest that the aggregate indicators of price/cost competitiveness do not adequately reflect the importance of these factors, which operate at the individual firm level. This may be due, first, to the fact that when there is firm heterogeneity with regard to export behaviour and, for example, profit margins or wages, this gives rise to problems when designing the sample for collecting data to construct aggregate statistics (see Broda and Weinstein (2007) for the implications of product creation and destruction for the CPI). Second, even when the sampling is appropriate, the construction of aggregate price and cost indicators based on arithmetic means of firm level data is not sufficient to understand the aggregate behaviour, especially if the productivity distribution is strongly influenced by extreme values, as Altomonte et al. (2011) argue.<sup>6</sup>

As an example of this latter argument, a simple experiment has been conducted consisting in breaking down the aggregate ULCs for four countries using the firm-level data available in the EFIGE database. This exercise analyses whether the aggregate path of ULCs over the period 2002-07 adequately captures the behaviour of this same variable for firms considered individually.<sup>7</sup> The methodology used breaks down the path of ULCs into three main elements. The first element reflects, taking the initial domestic market share distribution as fixed, the importance of the average changes in ULCs at the firm level (constant shares).

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<sup>5</sup> See Bernard et al. (2011).

<sup>6</sup> This problem affects aggregation within a sector, but would be even more relevant when aggregating across sectors.

<sup>7</sup> Regrettably, the poor coverage of Germany in Amadeus prevents us from starting in 2001. In order to eliminate outliers, the most extreme values of ULCs for each country are eliminated (the same criterion being applied in all the countries).

The second component would keep the initial ULCs constant and would quantify the reallocation of resources (market shares) within the domestic economy (reallocation). Finally, the third element would reflect the interaction of these two elements (interaction).<sup>8</sup> If a significant loss of competitiveness is occurring at the firm level, one should observe that the first component has greater weight. On the other hand, if the economy's resources have been reallocated towards those firms that had lower ULCs at the beginning of the period, the second component would have greater weight. Finally, the third component has no immediate interpretation by itself, since firms whose price competitiveness is deteriorating would be losing domestic market share to those with favourable ULC developments.<sup>9</sup>

The results of this breakdown are shown in Panel A of Table 3. The first thing to note is that, on average over the period as a whole, real ULCs fell in all the countries, a result that is also obtained using the EU KLEMS database. Second, the weight of changes in competitiveness in specific firms is small, while resource reallocation and the interaction effect explain around 90% of the changes in ULCs for all the countries in the sample. The relative strength of each factor varies from country to country, with the reallocation effect being more important in those countries – France and Germany – that had lower aggregate ULC growth. Finally, in Panel B, which breaks down the changes in ULCs relative to Germany into the contributions of each of the above factors, one can see, for example, that in the period 2002-07 lower resource reallocation (in comparison with Germany) led to cost competitiveness losses of around 3.5% in the case of France, 5.5% in Italy, and 10% in Spain.

Thus, the changes in ULCs at the firm level play an important role in explaining the changes in ULCs relative to Germany, but the capacity to reallocate resources between firms within a single economy is even more important. In other words, lower resource reallocation, in comparison with Germany, towards firms that initially had lower ULCs explains more than 50% of the relative aggregate changes in ULCs.<sup>10</sup>

Fortunately, the instruments necessary to develop measures of competitiveness that take into account the reallocation of resources between firms with different characteristics are starting to become available (see Melitz (2003)). In addition, recent studies have estimated the extent to which aggregate productivity differences between the United States, India and China relate to inefficient resource allocation (Hsieh and Klenow (2009)) and what the export potential of France, Italy and Spain would be if they had a similar allocation of resources to Germany (Barba Navaretti et al. (2011)). In future, the development of these approaches will play an important role in the analysis of the determinants of competitiveness.

## Conclusions

Although competitiveness is relevant to various aspects of economic analysis, its empirical measurement runs up against a number of problems, arising from the vagueness of a concept

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<sup>8</sup> A fourth element (inflow and outflow) would capture how much of the change in ULCs at the aggregate level is due to differences in the changes in these indicators in the firms that are present during the whole period and in those that enter and/or leave at some point. Unfortunately, the design of the EFIGE survey does not allow inflows and outflows to be adequately captured, so that it was decided to ignore these elements in the discussion of the analysis.

<sup>9</sup> Insofar as the exercise considers manufacturing firms only, it would have its limits. However, recent studies perform similar exercises using sectoral data, demonstrating that the effect of resource reallocation at the sector level is also key to an understanding of the changes in aggregate ULCs.

<sup>10</sup> This role of resource reallocation confirms Altomonte et al. (2011), who show that a large part of the changes in relative aggregate productivity between France and Sweden is explained by greater resource reallocation across firms in the latter country.

Panel A: Changes in the ULCs of each country (annualised rate), 2002-2007 (b)

	Total	Constant shares	Reallocation	Interaction
France	-2.5	-1.2	-1.7	-0.6
Germany	-3.0	-1.7	-2.4	-0.4
Italy	-1.5	0.2	-1.4	-1.4
Spain	-2.0	-0.3	-0.7	-1.6

Panel B: Changes in the ULCs of each country relative to Germany, 2002-2007

	Total	Constant shares	Reallocation	Interaction
France	5.7	3.0	3.5	-0.9
Italy	10.7	10.2	5.4	-4.9
Spain	11.2	7.6	9.7	-6.0

SOURCES: EU-EFIGE/Bruegel-UniCredit dataset and Banco de España.

a Data are shown as percentages.

b The three components do not add up to the total because a fourth component that reflects inflows and outflows of companies is not shown.

that is used differently depending on the context. Moreover there is a lack of disaggregated indicators that adequately capture the wide range of factors relevant to competitiveness.

This article has presented evidence to support the idea that a complete analysis of competitiveness should combine the macroeconomic data that are normally used with micro-economic firm-level data reflecting the high degree of heterogeneity that exists, both across sectors and among the firms within a single sector, with regard to productivity and the propensity to export. In a preliminary attempt to make progress in this direction, evidence has been presented to suggest that the Spanish economy's loss of competitiveness in recent years does not seem to have occurred among the largest firms, with the greatest presence in international trade, but that it may be mainly the result of a lack of flexibility, which prevents resources from being efficiently reallocated between sectors and firms. In this case, improving Spain's competitiveness would require significant reforms in competition policy and in the labour market, given the rigidities in these areas that delay or prevent the achievement of an efficient allocation of resources.

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