The Recent Performance of Portuguese Trade in Goods: a Complementary Approach¹

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1. Introduction

The trade performance of a given country is usually assessed through simple and easily computable indicators, such as the share of exports on GDP, the degree of openness, the exports growth rate, or the change in market share (e.g. Marques, 2011a,b; Lamoureux, 2010). However, these measures provide an incomplete picture of the overall trade performance, and often lack the robustness to assess the trade performance of a given country. For instance, some countries may have a high degree of openness, but at the same time they may be losing market share for other countries, or registering below average exports growth rate. In other cases, countries may have a high exports growth rate because they are specialized in a small set of fast growing products, or exporting mainly to fast growing markets. Countries with a lower exports growth rate, but with a well-diversified array of products and markets, are probably in a better competitive position, as they are less permeable to specific demand shocks.

The International Trade Centre (ITC, 2007) computed a set of specific indicators aimed at tackling the aforementioned issues and providing a more complete picture of the trade performance of a given country. These indicators were computed using the United Nations' COMTRADE database, whose data covers 184 countries and more than 95% of the world trade in goods. In this article, we present several of these indicators for the Portuguese economy, and use them to assess the Portuguese relative trade performance within the EU15. The reported indicators provide a deeper understanding of the sources driving the change in market share, allowing one to assess the competitiveness evolution of Portuguese exports, the effects of product and market specialization in market share, or the capacity of the export sector to adapt to changes in the world demand. They also allow one to assess the degree and change of product and market diversification, and the evolution of the quality of exports.

The remaining article is organized as follows. We start with a brief description of these indicators. Afterwards, we use them to assess the recent Portuguese trade performance, and compare it with that of the EU15 countries. Our analysis complements the information on the subject presented in other articles (e.g. Júlio and Leão, 2011).

2. Description of Indicators

The ITC trade performance index consists of a set of indicators that allows one to assess a country's general profile, a country's position in world markets, and a country's change in the world market share. Several of these indicators are the traditional ones: value of exports and net exports, per capita exports, exports growth rate, or growth rate of per capita exports. Since these indicators are well documented (see, for instance, Júlio and Leão, 2011; Cabral, 2008; Amaral, 2006; or Cabral and Esteves, 2006), or are easily computable through simple statistics, available at the Eurostat or OECD databases, they will not be addressed in this article. Here, we are interested in those indicators which are traditionally less-known, perhaps because their interpretation is less straightforward and their computations are generically more complex. Below, we present a brief description of these indicators. Some carefulness in analyzing the

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results is warranted, however, as none of the indicators reported by the ITC includes services. This is certainly a drawback of the ITC trade performance index, as services represent around 20% of international trade, and more than 30% of Portuguese exports (Júlio and Pinheiro-Alves, 2011).

Relative change in world market share

The relative change in the world market share is the percentage change of a country's share of exports on total world exports. This change can be decomposed and arithmetically expressed as the sum of four effects (ITC, 2007):

 Competitiveness effect: corresponds to the percentage gain or loss in a country's aggregate market share that would occur if changes were only due to variations in the country's market share in import markets,¹ regardless of the structure of country's exports or of partner countries. If this effect is positive, then domestic products are becoming more competitive in world markets, contributing positively to the country's change in market share.

Let X_{ijk}^t be country *i*'s total exports to country *j* of product *k* at time *t*, X_{jk}^t be the total world exports to country *j* of product *k* at time *t*, and X_w^t denote total world exports at time *t*. Then, this effect can be mathematically expressed as

$$\sum_{j} \sum_{k} \left(\frac{X_{ijk}^t}{X_{jk}^t} - \frac{X_{ijk}^0}{X_{jk}^0} \right) \times \frac{X_{jk}^0}{X_w^0}$$

The term between brackets is the variation in country *i*'s market share in import markets (destination country *j* for product *k*), whereas the latter term is the weight of import markets in total world exports.

Structural geographic specialization effect: corresponds to the percentage gain or loss in a country's aggregate market share that would occur if changes were only due to the dynamism of its partner countries, regardless of the variations in the country's market share in these markets. This effect captures the idea that aggregate market share may increase simply because a country is exporting mainly to fast growing markets, even though it may not be gaining any market share in those markets. Letting X^t_{ij} denote total exports of country *i* to country *j* at time *t*, and X^t_j total exports of country *j* at time t, this effect and be formally expressed as

$$\sum_{j} \frac{X_{ij}^0}{X_j^0} \times \left(\frac{X_j^t}{X_w^t} - \frac{X_j^0}{X_w^0} \right)$$

The former term is country *i*'s initial market share in country *j*'s imports, and the expression between brackets is the change in country *j*'s world market share.

Structural product specialization effect: corresponds to the percentage gain or loss in a country's aggregate market share that result from the dynamism in the demand of exported products, regardless of the variation of the country's market share in these products. This effect captures the idea that market share may increase simply because a country is exporting products with a fast growing demand. Analytically, this effect can be expressed as

$$\sum_{j} \sum_{k} \left(\frac{X_{ijk}^{0}}{X_{jk}^{0}} - \frac{X_{ij}^{0}}{X_{j}^{0}} \right) \times \left(\frac{X_{jk}^{t}}{X_{w}^{t}} - \frac{X_{jk}^{0}}{X_{w}^{0}} \right)$$

¹ An "import market" is defined as the destination country of a specific industry. For instance, the export of paper to Spain defines an import market. On the other hand, we use "market" or "destination market" to refer to the partner country.

The first expression between brackets is the difference between country *i*'s initial market share in import markets and that country's initial market share in country *j*'s imports, whereas the second expression between brackets is the change in the share of import markets in total world exports.

 Adaptation effect: measures a country's ability to adjust its exports to changes in the world demand. This effect captures the idea that market share may increase simply because a country is able to increase its market share in fast growing import markets, and decrease it in slow growing import markets. Mathematically, this can be expressed as

$$\sum_{j} \sum_{k} \left(\frac{X_{ijk}^t}{X_{jk}^t} - \frac{X_{ijk}^0}{X_{jk}^0} \right) \times \left(\frac{X_{jk}^t}{X_w^t} - \frac{X_{jk}^0}{X_w^0} \right)$$

The first expression between brackets is the change in country *i*'s market share in import markets, and the second expression between brackets is the change in the share of import markets in total world exports. Note that the structural geographic specialization effect and the structural product specialization effect are dependent on the initial conditions, and as such they measure the gains or losses in a country's aggregate market share given the initial specialization of the economy. On the other hand, the adaptation effect measures the country's ability to change the specialization pattern towards import markets that have an above average performance, and decrease it in import markets that are performing below average.

To summarize, the change in the market share depends on whether domestic exports are becoming more or less competitive, are initially concentrated in fast or slow growing markets or in products with a fast or slow growing world demand, and are able to adjust to the dynamics of world demand by shifting away from slow growing towards fast growing import markets or *vice-versa*.

Product diversification

A diversified export sector is not dependent on a small number of products, and is therefore less vulnerable to industry-specific external shocks. To measure product diversification, two complementary indicators can be used: the equivalent number (EN), and the spread index.

The EN is simply the inverse of the Herfindahl index,

$$EN_i^t = \left(\sum_k \left(\frac{X_{ik}^t}{X_i^t}\right)^2\right)^{-1}$$

where X_{ik}^t represents country *i*'s exports of product *k* at time *t*, and X_i^t denotes *i*'s exports at time *t*. The EN represents the number of products which would be equivalent to the observed concentration if all products had an identical share in exports. For instance, if a country with 8 export industries has an EN of 5, then the product concentration is equivalent to that of a country with 5 export industries of equal size. Obviously, the higher is the EN, the greater the product diversification of the export sector.

However, this indicator is insufficient to rank countries with a similar EN according to product diversification, as it does not take into account the dispersion of exports across products. To overcome this difficulty, a spread index is also used. This index measures the dispersion of product exports, and is calculated as a weighted standard deviation, normalized by the average value of exports, *i.e.*

$$S_i^t = \frac{1}{N \times \overline{X}_i^t} \times \sqrt{\sum_k \left(X_{ik}^t - \overline{X}_i^t\right)^2}$$

where \overline{X}_i^t is the average value of *i*'s exports in year *t*, and the remaining notation is as previously introduced. A decrease in the spread index, for the same level of concentration, means a decrease in risk, since when exports are less dispersed (more equally distributed) across products, the country becomes less permeable to industry-specific shocks in industries whose share in total exports is highest. For

instance, a country with 5 export industries of equal size has an EN of 5, the same value of the country with 8 export industries from the previously example. However, the country with 8 export industries is obviously less diversified, as its exports are dispersed across more industries.

The EN is more appropriate to assess the level of product concentration and to rank countries according to their diversification, since it is computed through a well-known measure of concentration. The spread index is more useful to rank countries with a similar EN of products, as it measures the dispersion of the distribution of exports, which may change with concentration.

Diversification of markets

Analogously to product diversification, an export sector which has a diversified set of partner countries is less vulnerable to shocks within destination markets. The diversification in export markets is assessed through the same indicators used to measure product diversification – the EN and the spread index – and a direct analogy between product and market diversification can be directly established. The formulas are also as above, except that X_{ik}^t must be replaced by X_{ij}^t and the sums are across *j* instead of *k*.

Relative unit value

The relative unit value is the ratio of a country's average unit value of exports to the world unit average. This measure is interpreted by the ITC as an indicator of product quality: if products are vertically differentiated and markets are competitive, then better products will have higher unit values, whereas homogeneous products will have the same unit value. Hence, a value of 1 indicates that the country's quality of exports is similar to the world average, whereas a value above 1 indicates that the country's exports have a better quality than the world average.

3. The Portuguese Trade Performance

3.1 Relative change in world market share

In a similar way to all the EU15 countries, the market share of the Portuguese economy in the export of goods has been decreasing since the beginning of the past decade (Figure 1). Between 2001 and 2005, the Portuguese market share fell at a yearly rate of 1.8%; between 2005 and 2009 this rate decreased to 1.1%, a value that puts Portugal as the 5th country in the EU15 with the lowest relative loss in market share in this period (see 4.1 below)¹.

The largest fraction of the yearly -1.8% change in aggregate market share in the period between 2001 and 2005 is explained by the competitiveness effect and by the product specialization effect, which together add up to -2.5%. The remaining difference is mainly explained by the adaptation effect, which registered a value of 0.7%. The contribution of the geographic specialization effect is marginal. The negative value registered by the competitiveness effect is partially justified by the increase in competition from Asian countries, namely China and India, in textiles, leather, clothing and footwear – sectors whose combined weigh in the total exports of goods fell from 25.4% in 2001 to 17.7% in 2005, contributing negatively to the Portuguese exports growth rate in this period. The enlargement of the EU to Eastern countries, more focused on the sectors of transport equipment and electronic components, and endowed with cheaper labor, also contributed negatively to the competitiveness of Portuguese exports, as the individual yearly

¹ According to GEE calculation, Portugal's total world export market share, in goods and services, has increased 1.8% between 2005 and 2009. The Portuguese market share in goods and services increased in 2006, 2007 and 2009, and decreased in 2008 (Banco de Portugal, 2010). The recent Spring Economic Forecast (European Commission, 2011) states that Portugal lost 0.9% in export market share in 2010.

competitiveness effects of each of these two sectors in the 2001-2005 period were -6.3% and -9.5% respectively.





The negative performance in the product specialization effect is also explained by the excessive specialization of the Portuguese economy in the sectors of textiles, leather, clothing and footwear, but is due to a different reason – between 2001 and 2005, the world exports of textiles and leather, and clothing and footwear, grew at yearly rates of -0.9% and 0.7% respectively, well below the average growth rate of world exports of 3.6%. Wood products, whose share in the Portuguese exports of goods was around 9%, also displayed a worldwide below average exports growth rate, around -2.8%. This reveals that Portuguese exports were excessively concentrated in products with a slow growing world demand in this period. Finally, the adaptation effect is mostly explained by the sector of transport equipment, which registered a value of 1.7% in this indicator.

Between 2005 and 2009 the competitiveness effect and the product specialization effect were positive, but the geographic specialization effect and the adaptation effect became negative. In fact, the geographic specialization effect was the main contributor to the negative change in the relative world market share in this period: almost -1.4 percentage points out of the -1.1% yearly change in the relative world market share is explained by this effect. The difference is due to the net positive contribution of the remaining 3 effects. This evidence suggests that Portuguese products became more competitive in world markets in the period 2005-2009 relative to the period 2001-2005. We can point out several reasons that explain this shift in performance. First, the largest fraction of the adjustment in the sectors of textiles, leather, clothing and footwear that resulted from the increase in worldwide competition seemed to take place in the period 2001-2005. Second, Portuguese firms in these sectors were able to innovate and increase the quality of their products, which allowed them to vertically differentiate from the cheaper Asian products. In fact, although the competitiveness effects of these sectors were still negative in the 2005-2009 period, they increased in absolute value relative to the 2001-2005 period. Third, the competitiveness effect of the Portuguese export sector increased drastically in the sectors of wood products (from -7.2% to 9.5% at yearly rates), of fresh food (from 2.1% to 7.1%) and of transport equipment (from -6.3% to 1.9%), between the 2001-2005 and the 2005-2009 periods.

Despite the recent diversification in destination countries, Portuguese exports are still mostly concentrated in EU markets, whose weak dynamic and slower growth in the 2005-2009 period explain the negative

geographic specialization effect. A great fraction of the performance in the product specialization effect in the 2005-2009 period is explained by the diversification of Portuguese exports across products (see the next section), and namely the fall in the weight of products in the sectors of textiles, leather, clothing and footwear – which continued to be characterized by a slow growing world demand in this period – in total exports.

3.2 Product and market diversification

Figure 2 presents a scatter plot of the EN of products and the spread of product concentration. According to the EN, Portuguese exports became more diversified in terms of the range of products exported between 2005 and 2009. This change in the pattern of exports is particularly noticeable between 2006 and 2007, when the EN of products registered a nearly 10 points increase, from 56 to 66. This means that, if our exports were divided equally across all exported products, the range of products exported would have increased. The increase in product diversification in the 2005-2009 period is explained by the fall in the share of important products in total exports – the most significant being textile articles, clothes and clothing accessories, footwear, and articles of cork, electrical equipment, and vehicles – which was compensated for by the increase in the share of several products whose weight in total exports was initially low – namely food products. In the same period, the spread of product concentration has also increased, meaning that Portuguese exports became more dispersed across products.



Figure 2. Equivalent number of products and spread of product concentration, 2005-2009

In Figure 3 we present a scatter plot with the same measures, but for market diversification. Here, there is no clear trend in which concerns the EN of destination markets. The exception is 2008, when the EN of markets registered a higher value than in the remaining years. One possible contribution to this momentaneous increase in diversification is given by the temporary fall in the share of exports to several important markets – namely France, Germany, and the United Kingdom – that occurred in 2008. However, other factors may have contributed, such as the increase in the share of exports to Angola and the decrease in the share of exports to the United States, which occurred in the second half of the decade, but were more expressive in the period 2007-2009. The spread of market concentration, in turn, displayed an irregular pattern in the period between 2005 and 2009, meaning that there was no clear trend in the risk originating from the concentration of exports across markets. All in all, these two measures suggest that the diversification of Portuguese exports across destination markets remained roughly unchanged in the period 2005-2009.



Figure 3. Equivalent number of markets and spread of market concentration, 2005-2009

It should be noted, however, that the outcome of these measures depends on the assumptions about how products and destination markets are classified and aggregated. In their computations, the ITC considers a broad number of products, and classifies markets at the country level. This analysis captures shifts in the pattern of exports at a disaggregated level, but may not capture global changes that require a more aggregated data. To illustrate this point, Figure 4 scatters the EN of sectors,¹ and the EN of markets (calculated using a broader concept of markets),² from 2000 until 2010. The trend is clearly positive across both dimensions, not only for the whole decade, but also for the 2005-2009 period, suggesting an increase in diversification across sectors and across markets.

Our measure of the EN of sectors provides a similar message to that of the ITC's EN of products, but its increase over time is more regular. The increase in the EN of sectors is explained by the decrease in the share of exports in sectors whose share was initially high – namely textiles and leather, clothing and footwear, machinery, and transport equipment. The exports of these sectors were replaced by others with a lower initial weight in exports, such as food products, energy, chemicals, and mineral and metal products. The ITC's EN also captures this shift in the pattern of exports, but at a more disaggregated level. However, since product shares in total exports are much lower than sector shares, the changes in the EN will also be much lower, and therefore this global shift is harder to capture.

A similar argument holds for the EN of markets. Our measure of the EN of markets captures the decrease in the share of exports to the EU15 that occurred between 2005 and 2009, which was compensated for by an increase in exports to Africa, namely Angola. According to this perspective, there is a clear diversification in exports, since the EU15 accounted for more than 75% of total Portuguese exports in 2005, but only 71.3% in 2009. Despite this, the share of exports to several important EU15 countries – notably France, Germany, Italy, the United Kingdom and Spain – displayed an erratic trend in the same period, which explains the behavior of the ITC's EN of markets in this period.

¹ Nine sectors were considered: food products; energy; chemicals; wood, paper and cork; textiles, leather, clothing and footwear; minerals and metal products; machinery; transport equipment; and other products.

² The following markets were considered: EU15; enlargement countries; other European countries; Maghreb; PALOP; other African countries; North America; Mercosur; other American countries; ASEM; other Asian countries; and Oceania.



Figure 4. Equivalent number of sectors and markets, 2000-2010. See footnotes 6 and 7 on the assumptions about sectors and markets

3.3 Relative unit value

The relative unit value of Portuguese exports was systematically above 1 between 2005 and 2009, and displayed an increasing trend from 2005 until 2008 (Figure 5). This suggests that Portuguese exports had a better than average quality relative to world exports in this period. In 2009, the relative unit value of Portuguese exports fell abruptly, from 1.4 to 1.2. This decrease may be at least partially explained by the significant fall in the exports of durable goods, such as machinery and transport equipment, in that year, that resulted from the triggering of the world financial crisis, a few months earlier. These types of goods have a higher average quality as compared to other goods, and thus a fall in their exports has a negative impact on the relative unit value. In fact, except for Ireland and the Netherlands, the relative unit value decreased in all EU15 countries between 2008 and 2009, indicating that this was not a specific Portuguese phenomenon.

4. International Comparisons with EU15 Countries

4.1 Relative change in world market share

As it was noted above, Portugal lost market share at a yearly rate of 1.8% between 2001 and 2005, the 9th best performance in the EU15. Between 2005 and 2009, this rate decreased to 1.1% – the fifth best performance in the period, behind the Netherlands, Spain, Germany and Greece (Figure 6)¹.

¹ Please note that this refers to a relative change in world market shares and not to an absolute change in export values. According to the ITC, all EU15 countries have lost market share between 2001 and 2009. The Netherlands and Austria are the best performing countries, with the lowest loss in aggregate market share (respectively 1.9% and 2.9% in cumulative terms), whereas the Portuguese aggregate market share decreased approximately by 11.5%, a value that puts Portugal as the 8th country in the EU15 with the lowest relative loss in market share. Ireland and the United Kingdom are the countries with the highest loss in aggregate market share (respectively 31% and 37% in cumulative terms).



Figure 5. Portugal - Relative unit value, 2005-2009





Although product specialization is the effect which presents the highest contribution to the Portuguese relative change in the world market share, the effects that most contributed to Portugal's relative position in the EU15 in the 2005-2009 period were the competitiveness effect and the adaptation effect. In both, Portugal is ranked in 3rd place among EU15 countries. Furthermore, Portugal is one of the three countries which presented a positive competitiveness effect in this period, behind the Netherlands and Germany. The adaptation effect was slightly negative, but above that of Germany, the Netherlands, Spain, the United Kingdom and Greece, for instance. This suggests that Portuguese exports were among the ones which gained more competitiveness among EU15 countries in relative terms, and that they had an above average capacity to adapt to changes in the world demand *vis-à-vis* these countries between 2005 and 2009. On the opposite direction, Portugal is not very well ranked in the product specialization effect, and above all, in the geographic specialization effect. Concerning the product specialization effect, Portugal displays a positive value, around 0.2%, but is only ranked 7th among EU15 countries. Austria and Greece

have the highest product specialization effect -2% and 1.9% respectively. Regarding the geographic specialization effect, Portugal displays the 2^{nd} worst performance among the EU15 countries, with a value of -1.4%. Only Ireland has a lower value, around -2.1%. Figure 7 presents a summary of these 4 effects for the EU15.

4.2 Product and market diversification

Portugal exports a diversified set of products as compared to the EU15 countries. The EN of products shows that Portugal is ranked 4th is this respect, behind Italy, Austria and the Netherlands. The spread of product concentration is among the highest in the EU15, behind that of Italy, Austria, France and Denmark. Since Denmark and Portugal have a similar EN, but the spread of product concentration is higher for Denmark, one could rank Portugal in 4th place among EU15 as regards to product diversification.

The market diversification measures convey the opposite picture: while Portuguese exports are still concentrated in a reduced number of markets, the spread of exports over these markets is relatively low. In fact, Portugal is ranked in 14th place both in respect to the EN of markets and the spread of market concentration. The low value of the EN is the result of a high concentration of exports in a few markets, such as Spain, Germany, and France, which together accounted for more than half of Portuguese exports in 2009. These results are illustrated in Figure 8.

4.3 Relative unit value

In the 2005-2009 period, Portugal displayed the lowest relative unit value among EU15 countries (around 1.2), meaning that the quality of Portuguese products in export markets is relatively low (Figure 9). Luxembourg and Ireland had the highest values, respectively 2.2 and 2.1. We therefore conclude that product quality is clearly an area that may, in the near future, improve Portuguese exports.

5. Final Remarks

The trade performance of a country cannot be fully assessed through traditional indicators, such as the exports growth rate or the degree of openness, since these measures provide only an incomplete characterization of the export sector. In this article, we described a set of indicators that provide a deeper understanding of the driving forces behind the change in the market share, and of the changes in product and market diversification. Our main conclusions are summarized as follows:

- The competitiveness of Portuguese exports displayed the 3rd largest percentage increase among EU15 countries between 2005 and 2009;
- Portuguese exports are still focused on slow growing markets, and could be better targeted to fast growing products;
- As compared to other EU15 countries, Portugal exports a well-diversified array of products, but exports are still very concentrated in few markets, namely in the EU15;
- On average, the quality of Portuguese exports has room for improvement.



Figure 7: The competitiveness effect (upper-left corner), the product specialization effect (upper-right corner), the geographic specialization effect (lower-left corner) and the adaptation effect (lower-right corner), for EU15 countries, 2005-2009 averages Figure 8: The equivalent number of products (upper-left corner), the equivalent number of markets (upper-right corner), the spread of product concentration (lower-left corner) and the spread of market concentration (lower-right corner), for EU15 countries, 2005-2009 average





Figure 9: Relative unit value for EU15 countries, 2005-2009 average

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