FOREIGN COMPETITORS’ PRICE AGGREGATION IN COMPUTING PRICE-COMPETITIVENESS INDICATORS: AN APPLICATION TO THE EU15 COUNTRIES*

Paulo Soares Esteves**

1. INTRODUCTION

This paper discusses the different ways of computing real effective exchange rates. It shows the implications of using the information on price levels for each country, instead of the usual procedure where the foreign price indicator is computed using growth rates of prices in each of the economies considered as competitors.

This approach may imply major differences in an analysis of the reasons underlying the recent evolution of the real exchange rate, in the light of increasing competition from some emerging economies with very low production cost levels. In contrast with the most common approach, this indicator is able to gauge the effect of the trade structure on the level of price-competitiveness. Very low-cost countries may be increasing their presence in international markets and thus putting additional pressure on domestic exporters, but traditional indicators point to an increase of national price-competitiveness if those third countries have a higher inflation rate.

In this context, the use of information on price levels, although subject to some drawbacks, may contribute to a better understanding of the evolution of export market shares. This was pointed out in Turner and Van’t dack (1993), who suggested using information on cost levels to account for the competition from emerging countries, as the traditional indicators – based on growth rates – tend to minimize the competitiveness effects of their increasing presence on world markets. This problem has certainly become even more acute over recent years due to the participation of new players in international trade, in particular China, other developing Asian economies and countries from Central and Eastern Europe.

This paper is organized as follows. Section 2 presents the implication of using information on price levels, emphasizing the differences from the results obtained with the most common real exchange rate indicator. Section 3 presents an application to the EU15 market, describing the evolution of market shares between member countries and outside competitors for the period from 1980 to 2005, and computing the two price-competitiveness indicators for the period after 1993. Finally, Section 4 summarizes the main conclusions.

2. AGGREGATING INTERNATIONAL PRICES

The Real Effective Exchange Rate (REER) indicators compare the evolution of domestic prices ($P$) with a weighted average of the prices in each $i$ competitor country ($P_i$) converted to domestic currency using the bilateral exchange rate ($E_i$). The weights used in the aggregation of international prices de-
pend on whether the objective is to measure national price-competitiveness in domestic or external markets. Traditionally, this aggregation is carried out by using international prices expressed in growth rates. Even when the weights are updated, this is done through a chain linking procedure, which means that the growth of the aggregated foreign price results from a weighted average of the evolution of prices in the countries considered as competitors.

Assuming n foreign countries, the usual indicator of real effective exchange rate (REER) is easily computed following recursively:

\[
REER_t = \frac{\left( \frac{P_t}{P_{t-1}} \right)}{\prod_{i=1}^{n} \left( \frac{P_i^t}{P_i^{t-1}} \right)} \quad (1)
\]

In logarithmic terms (lower case letters) its evolution may be expressed as:

\[
\Delta \text{reer}_t = \Delta p_t - \sum_{i=1}^{n} w'_{i, t-1} \left( \Delta p_i^t - \Delta e_i^t \right) \quad (2)
\]

It is possible to obtain relative price levels through the difference between market exchange rates and purchasing power parity (PPP) exchange rates – the ones usually used to compare GDP levels across economies. The direct use of that information leads to the following real effective exchange rate (REER*):

\[
REER_{t}^* = \prod_{i=1}^{n} \left( \frac{P_i^t}{P_i^t / E_i^t} \right)^{w_i^t} \quad (3)
\]

The main difference is that foreign prices are aggregated in levels, and the respective weights are allowed to change in two consecutive periods. The evolution of this indicator is given by:

\[
\Delta \text{reer}_{t}^* = \sum_{i=1}^{n} w'_{i, t-1} \left[ \Delta p_i^t - \left( \Delta p_i^t - \Delta e_i^t \right) \right] + \sum_{i=1}^{n} \Delta w_i^t \left[ p_i^t - \left( p_i^t - e_i^t \right) \right] \quad (4)
\]

Defining Pr_i^t as the relative price in relation to each competitor i, the difference between the two indicators is:

\[
\Delta \text{reer}_{t}^* - \Delta \text{reer}_{t} = \sum_{i=1}^{n} \Delta w_i^t \cdot Pr_i^t \quad (5)
\]

This difference could be interpreted as an international trade structure effect.¹ As the changes in weights add up to zero and price levels are measured in relative terms, this structure effect implies an additional real appreciation (depreciation) of the domestic currency if competitor countries with lower prices (higher prices) are increasing their market share.

¹ Estimations of this structure effect have been made to measure the impact on import prices of increasing international competition from countries with very low cost levels [see for example, Bank of Finland (2006), ECB (2006) e Sveriges Riksbank (2005)]. The same type of analyses was done in Røstøen (2004) when building an international price indicator able to explain the evolution of the imported consumer goods deflator.
3. AN APPLICATION TO THE EU15 MARKET

This section presents an application to the EU15 market, computing a real effective exchange rate indicator based on price levels to measure price-competitiveness of EU15 countries exports. Given the lack of information in real terms, market shares are calculated in nominal terms. Thus, the analysis has been limited to manufacturing trade, as the traditional high volatility of commodity prices tends to distort the trade shares for total goods based on nominal data. These market shares are computed for the period 1980 - 2005, while the real exchange rate indicators are calculated only for the period after 1993, due to the lack of information for the earlier period.

The information on trade flows is obtained from the CEPII-CHELEM database until 2004, updated with the growth rates for 2005 obtained from the World Trade Atlas (WTA). Relative price levels were obtained from the IMF (2006 September World Economic Outlook database) by taking the difference between the PPP exchange rate used to compare the GDP level across countries with the observed exchange rates.\(^2\)

The use of data for relative price levels is subject to limitations over the problems posed by the more usual real exchange rate indicators. Differences in price levels in various countries are based on indicators such as the CPI or the GDP deflators, which also cover the non-tradable sector and are not adjusted by productivity growth differentials, and these differences may be influenced too by structural factors that are not related with the ability to compete in world markets. In particular, as the differences in price levels across countries are particularly relevant for the non-tradable sector\(^3\), the use of this price level data to compute competitiveness indicators tends to overestimate the differences between prices of traded goods. Additionally, there are questions about the availability and robustness of the PPP data for some developing countries, given the fact that some of this information is only estimated.\(^4\)

3.1. The EU15 market

Considering the EU15 market, the intra and extra import shares allows to evaluate the relative position of competing countries. It should be mentioned that these intra shares not only measure competitiveness on the import side, but they also reflect export performance of the EU15 countries. In fact, as total imports include both intra and extra imports, the share of intra imports is equal to the sum of member country export shares in this market.

As can be seen from Chart 1, there was a downward trend of intra EU15 share on total imports of manufacturing from the beginning of the 90s, from figures close to 73 per cent to a level slightly above 65 per cent in 2005. Part of this decline might possibly be related with the increasing integration of markets, and therefore it might not reflect a decline of competitiveness if EU15 countries were gaining market share in external markets. However, a recent evaluation of extra euro-area exports points also to a decline in market share over the most recent years - see ECB (2005) for an analysis of the export performance of the euro area.

---

\(^2\) The same type of information was used in Røstøen (2004) to compute price levels for a number of countries.

\(^3\) On this issue see Bhagwati (1984) that formalizes an idea early presented in Balassa (1964) and Samuelson (1964) and points an alternative explanation to understand why services are cheaper in poor countries.

\(^4\) In the case of the IMF, these estimations are derived from a cross-section regression between PPP-based GDP per capita and GDP per capita at market rates. See Box A2 of April 2004 World Economic Outlook for the last update of PPP weights, based on benchmark surveys of national prices of 2000 released by the World Bank as part of the United Nations International Comparison Project. A description of this estimation process is presented in Box A1 of the May 2000 World Economic Outlook.
The decline of the intra import share is associated with some structural changes concerning the relative importance of the main foreign suppliers (Chart 2). The share of imports from other developed countries recorded a big decline from the beginning of the 90s, from average levels close to 65 per cent in the 80s to a share of around 35 per cent in 2005. The increase of developing economies’ shares in the EU15 market over the last 15 years has been related with the maintenance of strong market share gains of Asian countries, and the new dynamics of some countries from Central and Eastern Europe, certainly in the wake of the major political and economic changes after the Berlin wall collapse. In this period shares of manufacturing imports from Africa and Latin America remained basically stable at levels close to 3 per cent. Obviously an analysis based on broad aggregates may mask important differences between certain countries, and thus it may therefore be helpful to look at more detailed information.

Table 1 considers the non EU15 countries that recorded higher market share gains and losses in the EU15 market. Over the last 25 years, the main gainers were China and some countries from Central and Eastern Europe, in particular the Czech Republic, Hungary, Poland and Turkey. Against this, the main losers in manufacturing exports to the EU15 were some important developed countries, in particular the US and Japan.

This change in suppliers is more evident from 1993 onwards, and has become even more pronounced in the most recent years, as the pace of market share gains of developing countries has increased. This is notably evident for China: the annual growth of its market share in EU15 manufacturing imports increased from 0.05 percentage points during the 80s to a figure 10 times higher (more than 0.5 percentage points in the most recent years).

The decline in the market share of developed countries in the EU15 only became clear during the 90s. Over the 80s the gains of some emerging economies were offset by the losses of other emerging coun-
tries, in particular the ex-Soviet block economies. Thereafter, the situation changed. The gains of developing countries corresponded to losses among developed countries. Japan, the US and Switzerland were the countries that have recorded the worst performance since 1993, followed by Hong Kong and Taiwan.

3.2. Real exchange rate indicators

The real exchange rate compares prices in the EU15 countries with external prices aggregated according to the following weights:

$$W_i = \frac{M_{EU15}^i}{\sum_{i=1}^{n} M_{EU15}^i}, \quad i = 1, 2, \ldots, n$$  \hspace{1cm} (6)

where $M_{EU15}^i$ represents the EU15 imports from each of the n external competitors considered. It is possible to show that the index built to explain the intra trade share in total imports can be written as an aggregation of the real effective exchange rates oriented to measure export-competitiveness of each EU15 country. Assuming that the EU15 is a single market, i.e not considering any geographical or product specialization, it is easy to reach a real effective exchange rate to measure export competitiveness of each country $j$ to these market, using the following weights for the EU15 countries and for each foreign competitor:

### Table 1

**MAIN GAINERS AND LOSERS IN THE EU15 MANUFACTURING MARKET**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gainers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>China</td>
<td>0.16</td>
<td>China</td>
<td>0.05</td>
<td>China</td>
<td>0.27</td>
</tr>
<tr>
<td>Czech Re.</td>
<td>0.07</td>
<td>Czech Re.</td>
<td>0.04</td>
<td>Czech Re.</td>
<td>0.10</td>
</tr>
<tr>
<td>Hungary</td>
<td>0.05</td>
<td>Taiwan</td>
<td>0.04</td>
<td>Hungary</td>
<td>0.08</td>
</tr>
<tr>
<td>Poland</td>
<td>0.05</td>
<td>Turkey</td>
<td>0.03</td>
<td>Poland</td>
<td>0.08</td>
</tr>
<tr>
<td>Turkey</td>
<td>0.04</td>
<td>Singapore</td>
<td>0.03</td>
<td>Turkey</td>
<td>0.05</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Losers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Norway</td>
<td>-0.02</td>
<td>Hong Kong</td>
<td>-0.02</td>
<td>Taiwan</td>
<td>-0.03</td>
</tr>
<tr>
<td>Canada</td>
<td>-0.02</td>
<td>Rumania</td>
<td>-0.02</td>
<td>Hong Kong</td>
<td>-0.03</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>-0.03</td>
<td>Yugosl.</td>
<td>-0.03</td>
<td>Switzerland</td>
<td>-0.06</td>
</tr>
<tr>
<td>Japan</td>
<td>-0.03</td>
<td>Canada</td>
<td>-0.04</td>
<td>United States</td>
<td>-0.18</td>
</tr>
<tr>
<td>United States</td>
<td>-0.10</td>
<td>Former</td>
<td>-0.12</td>
<td>Japan</td>
<td>-0.19</td>
</tr>
</tbody>
</table>
where $Y_{EU15}$ is the value of the domestic production of the manufacturing sector in the EU15 - this corresponds to a particular application of the usual double weight scheme presented in a very intuitive way in Turner and Vant’t dack (1993). In this case, the current overall index (REER) can be obtained as an aggregation of the real effective exchange rates for each EU15 country (REER$_j$)

$$REER = \left[ \prod_j \left( \frac{Y_j}{Y_{EU15} + \sum_{i=1}^{n} M_i} \right)^{\alpha_j} \right]^{\frac{Y_{EU15}}{Y_{EU15} + \sum_{i=1}^{n} M_i}}$$

where $\alpha_j$ represents the weight of each country in the EU15 price aggregate.

Thus, the indicator built to explain the intra-import share on total EU15 imports may be seen as a price-competitiveness indicator of any specific member country’s exports to this market.

However, the direct application of this methodology to obtain results for national economies is not the most suitable because it would imply that the weight given to each foreign competitor would be the same for every EU15 country. For a better evaluation of the international competitiveness of each country it would be better to consider the different product specialization across EU15 countries and this would imply differentiated weights [see Esteves and Reis (2005)].

3.2.1. Relative price levels

The relative prices between the EU15 and its foreign competitors are the first items necessary to compute real effective exchange rate indicators. Chart 3 presents these relative prices from 1993 onwards, considering the set of country aggregates used above. Note that these aggregated figures are not the ones directly used for computation of the real effective exchange rate. The use of individual data for the price level in each foreign country may produce different results, given that the weight of each econ-
omy in the respective aggregate may differ significantly from its importance as a competitor in the EU15 market.

Two main results seem to emerge from these figures. The first is that the relative price level against the non-EU15 developed countries was relatively stationary, around an average slightly above one. The fluctuations of this relative price reflected mainly the evolution of the US$ exchange rate against the EU15 countries - the two series show a correlation coefficient of 0.86.

The second main result is the persistent lower relative price levels in emerging countries over the period considered. Special attention should be given to the Dynamic Asia aggregate. This is the region with the fastest and most sustainable market shares increase in the EU15 market, but where no price convergence has taken place. During the 90s, their prices levels were around 20 per cent of those observed in the EU15. The European developing countries also recorded a stronger presence in the EU15 market from the beginning of the 90’s, but they faced some price level convergence.

3.2.2. Aggregation weights

Table 2 presents the weights for external competitors, using the available information for 63 individual countries and presenting the 20 most important competitors according to their weights in 2005.

Table 2

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>0.215</td>
<td>0.233</td>
<td>0.187</td>
<td>0.245</td>
<td>0.156</td>
</tr>
<tr>
<td>China</td>
<td>0.064</td>
<td>0.045</td>
<td>0.096</td>
<td>0.033</td>
<td>0.128</td>
</tr>
<tr>
<td>Japan</td>
<td>0.119</td>
<td>0.135</td>
<td>0.093</td>
<td>0.166</td>
<td>0.081</td>
</tr>
<tr>
<td>Switzerland</td>
<td>0.089</td>
<td>0.095</td>
<td>0.080</td>
<td>0.107</td>
<td>0.078</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>0.033</td>
<td>0.026</td>
<td>0.045</td>
<td>0.016</td>
<td>0.052</td>
</tr>
<tr>
<td>Poland</td>
<td>0.037</td>
<td>0.030</td>
<td>0.047</td>
<td>0.024</td>
<td>0.052</td>
</tr>
<tr>
<td>Hungary</td>
<td>0.029</td>
<td>0.022</td>
<td>0.041</td>
<td>0.013</td>
<td>0.042</td>
</tr>
<tr>
<td>South Korea</td>
<td>0.032</td>
<td>0.032</td>
<td>0.033</td>
<td>0.028</td>
<td>0.036</td>
</tr>
<tr>
<td>Turkey</td>
<td>0.025</td>
<td>0.021</td>
<td>0.031</td>
<td>0.019</td>
<td>0.034</td>
</tr>
<tr>
<td>Russia</td>
<td>0.024</td>
<td>0.024</td>
<td>0.024</td>
<td>0.018</td>
<td>0.027</td>
</tr>
<tr>
<td>Taiwan</td>
<td>0.031</td>
<td>0.034</td>
<td>0.026</td>
<td>0.036</td>
<td>0.022</td>
</tr>
<tr>
<td>Norway</td>
<td>0.025</td>
<td>0.027</td>
<td>0.022</td>
<td>0.028</td>
<td>0.020</td>
</tr>
<tr>
<td>Brazil</td>
<td>0.016</td>
<td>0.019</td>
<td>0.018</td>
<td>0.021</td>
<td>0.019</td>
</tr>
<tr>
<td>India</td>
<td>0.016</td>
<td>0.016</td>
<td>0.017</td>
<td>0.015</td>
<td>0.018</td>
</tr>
<tr>
<td>Slovakia</td>
<td>0.011</td>
<td>0.008</td>
<td>0.016</td>
<td>0.005</td>
<td>0.017</td>
</tr>
<tr>
<td>Rumania</td>
<td>0.011</td>
<td>0.009</td>
<td>0.015</td>
<td>0.006</td>
<td>0.016</td>
</tr>
<tr>
<td>Malaysia</td>
<td>0.020</td>
<td>0.022</td>
<td>0.018</td>
<td>0.020</td>
<td>0.016</td>
</tr>
<tr>
<td>Singapore</td>
<td>0.016</td>
<td>0.020</td>
<td>0.015</td>
<td>0.020</td>
<td>0.016</td>
</tr>
<tr>
<td>Thailand</td>
<td>0.017</td>
<td>0.017</td>
<td>0.016</td>
<td>0.016</td>
<td>0.015</td>
</tr>
<tr>
<td>Canada</td>
<td>0.018</td>
<td>0.019</td>
<td>0.015</td>
<td>0.020</td>
<td>0.014</td>
</tr>
<tr>
<td>Coverage</td>
<td>0.854</td>
<td>0.854</td>
<td>0.854</td>
<td>0.855</td>
<td>0.859</td>
</tr>
</tbody>
</table>
As suggested in the previous section, there was a remarkable decline of the weight attributed to competition from other developed countries, in particular the US and Japan, but also Switzerland and Canada. These four economies are the only developed countries selected according to the above mentioned criterion. In the opposite direction, there was a remarkable increase in competition from some emerging economies, in especially China and the new EU members. The share of imports from China increased almost 10 percentage points from 1993, and this country is catching up with the US as the main exporter to the EU15 market; the Czech Republic, Poland and Hungary are becoming almost as important as Japan or Switzerland.

3.2.3. Real effective exchange rates

Using the weights and the price levels of the 63 countries mentioned above, it is easy to compute the two real exchange rate indicators (growth vs level aggregation). These are presented in Chart 4, along with the real effective exchange rate indicators computed and published by the ECB for the euro area. Additionally, Chart 5 compares these price-competitiveness indicators with the EU15 countries’ export market shares.

The computed indicator based on growth rates is relatively close to the figures for the euro area published by the ECB (correlation coefficients of 0.85), even though it covers different aggregates (EU15 vs euro area) and considers different foreign competitors and weighting schemes. These growth-based indicators do not show a clear trend, with the figure for 2005 being relatively close to the average observed during the period considered. This means that the negative trend of the EU15 countries’ market shares cannot be explained by these price-competitiveness indicators.

Chart 4

REAL EFFECTIVE EXCHANGE RATE FOR THE EU15 COUNTRIES
Indicators based on growth rates (1993=1)  Comparison between indicators based on price levels and growth rates (1993=1)

Note: (*) Taking into account the CPI (for the groups with 23 and 42 currencies) and GDP deflators for the 23.

(5) In order to improve comparability between the various competitiveness measures, these ECB indicators were also rebased to 1993=1. For detailed information on the calculation of these aggregates see Buldorini, Makrydakis and Thimann (2002) and the Box 10 entitled “Update of the overall trade weights for the effective exchange rates of the euro and computation of a new set of euro indicators” in the September 2004 issue of the ECB Monthly Bulletin.
The results are somewhat different when the alternative indicator (price level aggregation) is considered. This indicator suggests a significant loss of price-competitiveness in the EU15 countries over the period considered. Since 1993, the loss of competitiveness implicit in this indicator has been close to 42 per cent, while the traditional indicators point to a real appreciation of just 0.9 per cent. This indicator exhibits a negative correlation of around 0.5 with the EU15 market shares, and thus the existence of a relationship between the two variables should not be immediately disregarded. This may be explained by the strong endogenous feature of this indicator, which takes into account the recent evolution of the international trade structure and thus measures the effects related with the increasing openness of markets.

Chart 6 decomposes the evolution of the real effective exchange rate, and clearly shows the differences between the two indicators. As expected when facing this type of structural effect, the differences are less pronounced when the two series are evaluated in terms of first differences. Thus the choice between the two indicators becomes really important when the objective is to consider the level of competitiveness, instead of just explaining its short-run variation. The results confirm the effects of the international trade structure on price-competitiveness in the EU15 countries. The impact of this on the real appreciation of the exchange rate (see equation 5) was constantly positive, reaching an accumulated value of around 40 percentage points.

This real appreciation has been particularly impressive during the most recent years. Contrary to what occurred during the 90’s, the nominal appreciation of the euro from 2000 onwards was not offset by a substantial negative inflation differential, reflecting the generalized decline in inflation across the world economy. Furthermore, this real appreciation of around 15 per cent measured by the traditional indicator was reinforced by the increasing competition from some emerging countries with very low price levels - the level-based indicator points to a real appreciation of 35 per cent.
4. CONCLUSIONS

This paper examines an alternative way of aggregating foreign prices when computing real effective exchange rate indicators. The common procedure to compute real exchange rate indicators is to build the foreign price indicator as a weighted average of the growth rates of prices in the countries selected as competitors. An alternative to this conventional procedure is to make direct use of the information on price levels that are aggregated with variable weights. This different approach may be particularly important when the structure of international trade is changing markedly, as has occurred over the recent years, reflecting the increasing competition of some emerging economies from Asia and Central and Eastern Europe where production costs are very low.

Firstly, the paper analyses the geographical structure of the EU15 manufacturing market over the last 25 years. During the 80s, the export market shares of member countries remained broadly stable – the intra-trade share on total imports stood at levels slightly above 70 per cent. In that period, 2/3 of extra EU15 imports came from other developed countries, against 1/3 from developing countries. But this structure has changed markedly in the last 15 years. Both the export market shares of EU15 countries and of other external developed economies started to decline. The share of imports from developing countries in total EU15 countries’ imports has almost doubled since 1993 (from 10 to 20 per cent), and its weight on extra EU15 imports increased from 1/3 to 2/3. During this period, China was the country that recorded most gains, followed by the Czech Republic, Hungary, Poland and Turkey.

Secondly, the paper tries to evaluate the ability of price-competitiveness indicators to explain the decline of the EU15 countries’ market shares. The most common indicator based on growth rates does not show any trend since 1993, and thus is not able to explain the negative evolution of these market shares.

When the level-based indicator is considered, the results become very different, pointing towards a sustainable loss of competitiveness in EU15 countries. Traditional indicators point to a real apprecia-
tion of just 0.9 per cent since 1993, whereas the loss of competitiveness implicit in this indicator is
close to 42 per cent. This difference reflects the effects of the international trade structure, related with
increasing competition from some emerging market countries with very low price levels. Judging by the
negative correlation of this level-based indicator with the EU15 market shares, the existence of a
long-run relationship between the two variables should not be disregarded as it is when the more
traditional indicator is used.

The use of price-competitiveness indicators raises important problems. The low empirical adherence
of the price competitiveness indicators seem to be associated with a variety of factors: the lack of theo-
retical fundamentals, the relevant measure errors related with the available statistics and the endoge-
nous behaviour of the real exchange rate in relation to the economic growth. This article also points to
an additional problem, related to the inability of these indicators to gauge the effects from the recent
geographical changes in international trade.

REFERENCES

72, 584-596.


ECB (2005), “Competitiveness and the export performance of the euro area”, Task Force of the
Monetary Policy Committee of the European System of Central Banks, Occasional Paper Nº
30, June 2005.

Esteves, P. S. e C. Reis (2005), “Measuring export competitiveness: revisiting the effective exchange


46, 145-54.

Turner, P. and J. Van’t dack (1993), ”Measuring international price and cost competitiveness”, BIS