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**TRADE
CONSISTENCY IN
THE CONTEXT OF
THE EUROSISTEM
PROJECTION
EXERCISES
AN OVERVIEW**

by Kirstin Hubrich
and Tohmas Karlsson



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AN OVERVIEW¹

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ABSTRACT

The Eurosystem macroeconomic projection exercises are part of the input prepared for the Governing Council's decision-making meetings. Under the economic analysis pillar of the ECB's monetary policy strategy, they are a key element in the assessment of economic prospects and of the short to medium-term risks to price stability. The projection exercises are conducted on the basis of a number of "technical" assumptions. In particular, assumptions are made about future developments in world trade, foreign prices and nominal exchange rates. The purpose of the *trade consistency exercise (TCE)* is to ensure that individual country forecasts are consistent with each other regarding the assumptions made about the international environment. Trade consistency is ensured in two directions: first, the *cross-trade consistency* part of the TCE involves examining the consistency of the trade projections at any given point in time; and second, the *ex ante/ex post trade consistency* part involves comparing the projections for a given variable across different projection rounds. This paper provides a comprehensive description of the data and techniques underlying the trade consistency exercises in the context of the projection exercises of the Eurosystem and the ECB.

J.E.L. classifications: E37, E61, F14, F16, F17.

Keywords: Trade projections, cross-country consistency, market shares, competitiveness.

NON-TECHNICAL SUMMARY

The Eurosystem macroeconomic projection exercises are part of the input prepared for the Governing Council's decision-making meetings. Under the economic analysis pillar of the ECB's monetary policy strategy, they are a key element in the assessment of economic prospects and of the short to medium-term risks to price stability.

The *Broad Macroeconomic Projection Exercise (BMPE)*, in which all the euro area national central banks and the ECB are involved, is carried out twice a year. Its aim is to deliver the short and medium-term economic outlook for the euro area and the individual countries. The *ECB Staff Macroeconomic Projection Exercise (MPE)* is also carried out twice a year, alternating with the BMPE. Also delivering the short and medium-term economic outlook for the euro area and individual countries, its aim is to provide macroeconomic projections based on the latest information available.

The BMPE and the MPE are conducted on the basis of a number of "technical" assumptions. Some of these assumptions relate to the external environment for individual countries as well as for the euro area as a whole. In particular, assumptions are made about future developments in world trade, foreign prices (including oil and commodities prices) and nominal exchange rates.

Both national central banks (NCBs) and ECB staff prepare initial projections on the basis of the agreed assumptions. Each NCB prepares a projection for its own country, whereas ECB staff prepare a projection for each of the euro area members as well as a euro area aggregate projection. ECB staff also aggregate the NCB country projections. Once a complete set of projections is available, a number of consistency exercises are carried out. One necessary condition for these individual country forecasts to serve as a reliable basis for area-wide conclusions is that they are mutually consistent. It is the purpose of the *trade consistency exercise (TCE)* to ensure

that individual country forecasts are consistent with each other regarding the assumptions made about the international environment. Trade consistency is ensured in two directions: first, the cross-trade consistency part of the TCE involves examining the consistency of the trade projections at any given point in time; and second, the *ex-ante/ex-post trade consistency* part involves comparing the projections for a given variable across different iterations in a projection round.

In particular, the *cross-trade consistency* part of the TCE first checks the consistency of bilateral trade flows and prices within the euro area by incorporating countries' trade projections, and second, the consistency of trade flows and prices between the euro area and the rest of the world. In this context, an absolute comparison of export volume growth with export market growth and a comparison of trade prices with those of competitors are carried out. The final part of the cross-trade consistency assessment involves decomposing import prices, measured in domestic currency, into foreign non-energy and energy prices, domestic prices and the exchange rate according to long-run relationships. This provides a rough benchmark against which the actual projections of import prices in the different countries can be evaluated.

Whereas the cross-trade consistency part involves an economic assessment of trade projections, the second part of the consistency exercise, the so-called *ex-ante/ex-post trade consistency*, is a purely technical requirement, which involves imposing consistency between successive updates of exogenous variables for individual countries.

The TCE plays a central role in the projections. First, at the beginning of the projection exercise, the ECB provides, for each euro area country, the assumptions about foreign demand, competitors' prices, effective exchange rates and oil and commodity prices (the TCE variables). If deemed necessary, these assumptions are updated after each meeting of the Working

Group on Forecasting. The assumptions about the external environment enter directly into the projections of the NCBs and the ECB and are thus an important input for the projection exercises. Second, the analysis of the TCE is discussed at the meetings of the Working Group on Forecasting and of the Forecast Task Force and at internal meetings. The outcome of these discussions frequently results in revised trade projections for individual countries. Given the bottom-up approach used in these euro area forecasting exercises, the TCE contributes to the coordination of the individual country projections and to ensuring that they are mutually consistent.

This paper provides a comprehensive description of the data and techniques underlying the trade consistency exercises conducted in the context of the BMPEs and MPEs.

I INTRODUCTION

The Eurosystem macroeconomic projection exercises are part of the input prepared for the Governing Council's decision-making meetings. Under the economic analysis pillar of the ECB's monetary policy strategy, they are a key element in the assessment of economic prospects and of the short to medium-term risks to price stability. The *Broad Macroeconomic Projection Exercise (BMPE)* is carried out twice a year. Its aim is to deliver the short and medium-term economic outlook for the euro area and individual countries. The exercise involves staff from both the ECB and the national central banks (NCBs) in a process that ensures consistency between the euro area and individual country projections. It is conducted by the Working Group on Forecasting (WGF) under the responsibility and guidance of the Monetary Policy Committee (MPC). The results of and issues arising from the BMPE are compiled in a report, the BMPE Report, which is submitted to the Governing Council at its meetings at the beginning of June and December. A summary is published in the ECB's Monthly Bulletin.

The *ECB Staff Macroeconomic Projection Exercise (MPE)* is carried out twice a year in alternation with the BMPE. The MPE involves only ECB staff, who also compile a report based on the results and issues identified as important during the exercise. The MPE Report is presented to the MPC, which may give its opinion in the form of a letter to the President. The report is subsequently submitted to the Governing Council at its meetings at the beginning of March and September. A summary is published in the ECB's Monthly Bulletin.¹

The BMPE and the MPE are conducted on the basis of a number of "technical" assumptions. Some of these assumptions relate to the external environment for individual countries as well as for the euro area as a whole. In particular, assumptions are made about future developments in world trade, foreign prices (including oil and commodities prices) and nominal exchange rates.

Both national central banks (NCBs) and ECB staff prepare initial projections on the basis of the agreed assumptions. Each NCB prepares a projection for its own country, whereas ECB staff prepare a projection for each of the euro area members and a euro area aggregate projection. ECB staff also aggregate the NCB country projections. This means that the euro area projection is obtained through a bottom-up approach. Thus, the input into the TCE consists of NCB and ECB trade projections, technical assumptions and projections for the external environment.

Once a complete set of projections is available, a number of consistency exercises are carried out. One necessary condition for these individual country forecasts to serve as a reliable basis for area-wide conclusions is that they are mutually consistent. It is the purpose of the *trade consistency exercise (TCE)* to ensure that individual country forecasts are consistent with each other regarding the assumptions made about the international environment. Trade consistency is ensured in two directions: first, the *cross-trade consistency* part of the TCE examines the consistency of the trade projections at any given point in time; and second, the *ex ante/ex post trade consistency* part compares the projections for a given variable across different iterations of a given projection round.

The *cross-trade consistency* part of the TCE first checks the consistency of bilateral trade flows and prices across euro area countries' trade projections, as well as of trade flows and prices between the euro area and the rest of the world. In this context, an assessment of each country's projected export volume growth, export market growth and competitiveness is undertaken. Underlying these assessments and comparisons is a set of assumptions about oil and commodity price developments and trade flows and prices outside the euro area. Examples of issues considered in the cross-trade analysis are: whether the projected change in export markets and competitiveness is in line with historical

¹ For more general information, see also ECB (2001), "A guide to Eurosystem staff macroeconomic projection exercises".

developments and, if not, whether there are special factors explaining such deviations; and whether aggregate projected export flows are compatible with projected import flows. The final part of the cross-trade consistency assessment involves decomposing import prices, measured in domestic currency, into foreign non-energy and energy prices, domestic prices and the exchange rate in accordance with long-run relationships. This provides a rough benchmark against which the actual projections of import prices in the different countries can be evaluated.

Whereas the cross-trade consistency part of the TCE is concerned with an economic assessment of trade projections, the second part, the so-called *ex ante/ex post trade consistency*, is a purely technical, but nonetheless very important consistency requirement. It can be illustrated using foreign demand as an example. At the start of the projection process, the ECB supplies the Bundesbank with a foreign demand variable, which captures the development of German export markets. This foreign demand variable is computed as a weighted average of the imports of Germany's trading partners. For the individual country concerned (in this case Germany) this variable is treated as exogenous. However, once the first round of individual country projections have been made, the imports of Germany's trading partners will have changed. If one were to compute an updated value of German foreign demand, it would be different from the one initially used. The forecast is inconsistent in the sense that the *initial* value of German foreign demand is different from the value of German foreign demand that would result from using the *updated* projection figures.

The combination of the cross-trade and the *ex ante/ex post* analyses enables an assessment to be made of whether bilateral and aggregate trade flows and prices are consistent with each other.

The TCE plays a central role in the projections. First, at the beginning of the exercise, the ECB provides, for each euro area country, the assumptions about foreign demand, competitors' prices, effective exchange rates and oil and

commodity prices (the TCE variables). If deemed necessary, these assumptions are updated after each meeting of the Working Group on Forecasting. The assumptions about the external environment, the TCE variables, enter directly into the projections of the NCBs and the ECB and are thus an important input for the projection exercises. Section 5.1 illustrates how the differences between the first iterations of TCE variables used in the projections can be sizeable. Second, the analysis of the TCE is discussed at meetings of the Working Group on Forecasting and of the Forecast Task Force and at internal meetings. The outcome of these discussions frequently results in revised trade projections for individual countries. Given the bottom-up approach used in these euro area forecasting exercises, the TCE contributes to the coordination of the individual country projections and to ensuring that they are mutually consistent.

The TCE is currently described only very briefly in the overall general description of the projection exercises (see ECB, 2006). The purpose of this paper is to provide comprehensive documentation of the TCE procedures, including definition of the key variables, data sources and how the TCE is used in the projection exercises.

Regarding the data presented below, we provide a cross-country comparison of historical data for the period 1999-2007 to illustrate the different concepts used. Artificial data are used for all the forecast periods.

The outline of the paper is as follows. In Section 2 we present the definitions of a number of foreign trade indicators describing demand and competitiveness for both exports and imports. These indicators are subsequently used in Section 3, where we discuss the features of the "trade consistency" framework. Section 4 describes the data underlying the computation of the trade consistency variables. In Section 5 we illustrate how the TCE procedures are used in the quarterly macroeconomic projection exercises conducted by the ECB and the Eurosystem. Finally, Section 6 summarises and concludes.

2 FOREIGN TRADE INDICATORS

The purpose of this section is to provide a description of the export demand indicator, competitiveness measures and nominal effective exchange rates. These so-called TCE variables are part of the “external assumptions” of the BMPE and MPE. In addition, the TCE variables are used as exogenous foreign trade variables in the different multi-country model blocks (see Karlsson and McAdam, 2005).

The TCE variables are computed for each country belonging to the European Union (EU27). The present geographical breakdown of trading partners incorporates 85-95% of total exports of the individual EU27 countries, except for Cyprus (75%).

One fundamental issue when constructing a foreign demand, foreign price or effective exchange rate index is what type of index to use. One of the most common ways of constructing an index is to compute a geometrically weighted average. The geometric form has a number of advantages, for instance the percentage change is independent of the particular base used, whereas with an arithmetic index the size of a percentage change varies with the base. The geometric form is also attractive since the weights can be interpreted as elasticities (see e.g. Alsterlind, 2006, Brodsky, 1982, Ellis, 2001 and Loretan, 2005).

Another issue concerns whether to use constant or time-varying weights. Time-varying weights can be used to prevent the index from becoming increasingly outdated. However, this comes at a cost. One complication with a geometric-form index with variable weights concerns temporal aggregation, e.g. from daily quotations to quarterly data. Weighting the index geometrically with daily quotations and then aggregating to quarterly data gives a result that differs from an index that is constructed directly using quarterly averages of the individual components. The discrepancy, however, is usually quite small (see Alsterlind, 2006). Another complication is that the value of the index may change even

in the absence of a change in the individual components of the index.

The ECB calculates its official nominal and real effective exchange rate measures, both for the euro area and for its member countries, as a geometric weighted average of bilateral exchange rates, including third-market effects (see Buldorini et al., 2002).^{2,3}

For the TCE variables, we decided to employ time-varying weights in the form of three-year moving average trade shares, when computing our *foreign demand indicator (WDR)*, *competitors’ price indices (CXD and CMD)*, and *nominal effective exchange rates (EENX and EENM)*. It should be noted that the weights are held constant, at the last observed value, over the projection horizon. Apart from a slightly different geographical coverage, our computations differ in two other respects from the official ECB calculations. First, we use total goods when computing trade shares, whereas the official ECB calculations use manufactured goods only. Second, the TCE computations do not take into account the competition from domestic producers through domestic supply in each export market, whereas the official ECB calculations do. This is clearly a simplification, but it is mainly dictated by considerations of data availability (see Section 4 regarding data issues).

- 2 The methodology involves simple import weights and double export weights (accounting for third-market effects) and is based on three-year averages of manufacturing trade. For values up to 1998, the EER is calculated on the basis of the average weights for 1995-97, with values thereafter relying on average weights for the period 1999-2001. The weights assigned to individual currencies are updated every five years. For the calculation of effective exchange rates, see also Bayoumi et al. (2006), Lynch and Whitaker (2004), and Zanello and Desruelle (1997).
- 3 Updates of the official ECB effective exchange rates are reported in the box 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’s Monthly Bulletin and in the box entitled “The effective exchange rates of the euro following the recent euro area and EU enlargements” in the March 2007 issue of the ECB’s Monthly Bulletin.

2.1 THE EXPORT SIDE

The two main determinants of a country's exports are foreign demand and its competitiveness position relative to other countries competing on foreign markets. Foreign demand, which translates into demand for exports (*WDR*), is computed as a weighted average of the import volumes of trading partners. Export competitiveness is measured as the relative price between domestic prices and foreign prices, both measured in a common currency. Higher domestic prices, relative to foreign prices, decrease a country's export competitiveness. Foreign prices or competitors' prices, measured in foreign currency, (*CXUD*) is computed as a weighted average of trading partners' export prices. Finally, a nominal effective exchange rate (*EENX*) is used to translate foreign prices into euro. This rate is a weighted average of the bilateral exchange rates of trading partners, with the weights determined by the relative importance of each. These variables (*WDR*, *CXUD*, *EENX*) are computed for each EU27 country and for the consolidated euro area.

2.1.1 EXPORT DEMAND INDEX

The demand for the exports of country k is expressed in the form of an export demand index (WDR_k) which is calculated as a geometric average of the import volumes of the trading partners of country k :

$$\log[WDR_k(t)] = \sum_j x_{k,j}(t) \cdot \log[MTR_j(t)] \quad (2.1)$$

where MTR_j denotes total real (goods and services) imports of country j , and $x_{k,j}$ is the three-year moving average of the share of the total exports of country k going to country j . The weight $x_{k,j}$ can be interpreted as the elasticity of export demand of country k with respect to the imports of trading partner j .

If in equation (2.1) above we restrict the summation to include only countries belonging to the euro area, we can define the *intra-euro area export demand* index for country k as follows:

$$\log[WDR_k^{intra}(t)] = \sum_{j \in \text{euro area}} x_{k,j}^{in}(t) \cdot \log[MTR_j(t)] \quad (2.2)$$

where $x_{k,j}^{in}$ is the three-year moving average of the share of the total exports of country k going to euro area country j and $\sum_{j \in \text{euro area}} x_{k,j}^{in}(t) = 1.0$ for a given t .

Similarly, we can define an *extra-euro area export demand* index for country k by including only countries outside the euro area:

$$\log[WDR_k^{extra}(t)] = \sum_{j \notin \text{euro area}} x_{k,j}^{ex}(t) \cdot \log[MTR_j(t)] \quad (2.3)$$

where $x_{k,j}^{ex}$ is the three-year moving average of the share of the total exports of country k going to non-euro area country j and $\sum_{j \notin \text{euro area}} x_{k,j}^{ex}(t) = 1.0$ for a given t .

The relationship between the total export demand and the intra and extra-euro area components for country k is given by:

$$\log[WDR_k(t)] = \omega_k(t) \cdot \log[WDR_k^{intra}(t)] + (1 - \omega_k(t)) \cdot \log[WDR_k^{extra}(t)] \quad (2.4)$$

where ω_k denotes the intra-euro area export share of country k .

The export demand for the consolidated euro area, i.e. excluding trade taking place between euro area countries, so that only trade between euro area economies and countries/regions outside the euro area is considered, is computed as follows:

$$\log[WDR_{euro}(t)] = \sum_{j \notin \text{euro area}} x_{euro,j}(t) \cdot \log[MTR_j(t)] \quad (2.5)$$

where the weight $x_{euro,j}$ denotes the share of consolidated euro area exports going to country or region j outside the euro area.

2.1.2 COMPETITORS' PRICES

When computing a measure of competitors' prices on the export side it is necessary to include so-called third-market effects in order to get a comprehensive measure of export

competitiveness. These effects arise from the fact that a given country, let us say Germany, faces competition from several other countries in each of its export markets. Roughly 2% of German exports go to Japan, so the direct competition between German exporters and Japanese producers is quite small in Japan's domestic market. However the competition between German and Japanese producers in third-country markets, such as the United States, can be very fierce, and this has to be taken into account.⁴

Competitors' prices on the export side for country k , measured in US dollars, are obtained as a weighted average of competitors' export prices, in each country (or market) j that country k exports to, weighted by the share of total exports of country k going to country j :

$$\begin{aligned} \log[CXUD_k(t)] &= \sum_j x_{k,j}(t) \left[\frac{\sum_{i \neq k} m_{j,i}(t) \cdot \log[XTUD_i(t)]}{1 - m_{j,k}(t)} \right] \\ &= \sum_j x_{k,j}(t) \cdot \log[XTUD_{k,j}^*(t)] \end{aligned} \quad (2.6)$$

where $CXUD_k$ denotes competitor's prices on the export side, measured in US dollars, for country k , $x_{k,j}$ is the share of the total exports of country k going to country j , $m_{j,i}$ is the share of the total imports of country j coming from country i , $XTUD_i$ represents the export deflator for country i , denominated in US dollars, and $XTUD_{k,j}^*$ denotes the export prices of competitors of country k on market j , in the absence of imports from country k .

Thus, competitors' prices on the export side ($CXUD_k$) as defined by equation (2.6), are obtained as a double-weighted average of each of the individual competitor's export prices. The first stage of this weighting scheme defines the competitor's price ($XTUD_{k,j}^*$) faced by country k in each of its export markets j , as a weighted average of competitors' export prices. This price can also be interpreted as the import price of country j , in the absence of imports from country k . The weights employed ($m_{j,k}$) measure the importance of each exporting country with

respect to the total imports of country j . In the second stage, the competitors' prices ($XTUD_{k,j}^*$) faced by the exporting country k in each of its export markets j are aggregated, using as weights the shares of markets j in the total exports of country k , i.e. $x_{k,j}$. The double-weighting scheme in equation (2.6) can be re-written as a simple-weighting scheme as follows:

$$\begin{aligned} \log[CXUD_k(t)] &= \sum_j x_{k,j}(t) \left[\frac{\sum_{i \neq k} m_{j,i}(t) \cdot \log[XTUD_i(t)]}{1 - m_{j,k}(t)} \right] \\ &= \sum_{i \neq k} \log[XTUD_i(t)] \cdot \left[\sum_j \left(\frac{x_{k,j}(t)}{1 - m_{j,k}(t)} \right) \cdot m_{j,i}(t) \right] \\ &= \sum_{i \neq k} \beta_{k,i}(t) \cdot \log[XTUD_i(t)] \end{aligned} \quad (2.7)$$

From equation (2.7) it becomes apparent that the implicit weight of any given competitor i of country k is a function of its weight in each of country k 's export markets.

Just as in the case of the export demand index, we can decompose competitors' prices on the export side, for country k , into intra and extra-euro area components:

$$\begin{aligned} \log[CXUD_k^{intra}(t)] &= \sum_{j \in \text{euro area}} \beta_{k,j}^{in}(t) \cdot \log[XTUD_j(t)] \\ \log[CXUD_k^{extra}(t)] &= \sum_{j \notin \text{euro area}} \beta_{k,j}^{ex}(t) \cdot \log[XTUD_j(t)] \end{aligned} \quad (2.8)$$

where $\sum_{j \in \text{euro area}} \beta_{k,j}^{in}(t) = 1.0$ and $\sum_{j \notin \text{euro area}} \beta_{k,j}^{ex}(t) = 1.0$

for a given t . The relationship between the total competitors' prices on the export side and their intra and extra-euro area components, for country k , is given by:

$$\begin{aligned} \log[CXUD_k(t)] &= \phi_k(t) \cdot \log[CXUD_k^{intra}(t)] \\ &+ (1 - \phi_k(t)) \cdot \log[CXUD_k^{extra}(t)] \end{aligned} \quad (2.9)$$

4 Measures of competitors' prices play a major role in the estimation of exchange rate pass-through on the export and import side. See e.g. Bussière and Peltonen, 2008.

where φ_k denotes the intra-euro area trade weight of country k , taking third-market effects into account. This implies that, in general, φ_k differs from ω_k , which was used in the computation of the export demand index in equation (2.4).

Competitors' export prices for the consolidated euro area are given by:

$$\log[CXUD_{euro}(t)] = \sum_j x_{euro,j}(t) \left[\frac{\sum_{i \in \text{euro area}} m_{j,i}(t) \cdot \log[XTUD_i(t)]}{1 - m_{j,euro}(t)} \right] \quad (2.10)$$

where the weight $x_{euro,j}$ denotes the share of total exports from the consolidated euro area going to country j and the weight $m_{j,euro}$ denotes the share of total imports of country j coming from the consolidated euro area. Just as for individual countries, we can compute the simple weights for the euro area corresponding to equation (2.7) above.

Note that the competitors' prices, for country k , computed in equations (2.6-2.10) are measured in US dollars. However, we would like to measure the competitors' prices in euro, since we are ultimately interested in comparing them with the export prices of euro area countries. In order to obtain the competitors' prices, for country k , denominated in euro, we need to multiply by the bilateral exchange rate between the US dollar and the domestic currency of country k :

$$\begin{aligned} \log[CXD_k(t)] &= \log[EXR_k(t)] + \log[CXUD_k(t)] \\ \log[CXD_k^{intra}(t)] &= \log[EXR_k(t)] + \log[CXUD_k^{intra}(t)] \\ \log[CXD_k^{extra}(t)] &= \log[EXR_k(t)] + \log[CXUD_k^{extra}(t)] \\ \log[CXD_{euro}(t)] &= \log[EXR_{euro}(t)] + \log[CXUD_{euro}(t)] \end{aligned} \quad (2.11)$$

where EXR_k is the bilateral US dollar exchange rate for country k and EXR_{euro} is the bilateral euro/US dollar exchange rate. After the introduction of the euro, obviously $EXR_k = EXR_{euro}$.

2.1.3 NOMINAL EFFECTIVE EXCHANGE RATE

When computing the nominal effective exchange rate on the export side for country k , the same

double-weighting scheme is used as for $CXUD_k$, so that third-market effects are taken into account:

$$\log[EENX_k(t)] = \log[EXR_k(t)] - \sum_{j \neq k} x_{k,j}(t) \left[\frac{\sum_{i \neq k} m_{j,i}(t) \cdot \log[EXR_i(t)]}{1 - m_{j,i}(t)} \right] \quad (2.12)$$

where EXR_k is the bilateral US dollar exchange rate for country k and $m_{j,i}$ and $x_{k,j}$ denote import and export shares.

As in the case of competitors' export prices, we can re-write equation (2.12) using a simple-weighting scheme:

$$\log[EENX_k(t)] = \log[EXR_k(t)] - \sum_{i \neq k} \beta_{k,i}(t) \cdot \log[EXR_k(t)] \quad (2.13)$$

The measure of the effective exchange rate on the export side for the consolidated euro area is computed as:

$$\log[EENX_{euro}(t)] = \log[EXR_{euro}(t)] - \sum_j x_{euro,j}(t) \left[\frac{\sum_{i \in \text{euro area}} m_{j,i}(t) \cdot \log[EXR_i(t)]}{1 - m_{j,euro}(t)} \right] \quad (2.14)$$

where EXR_{euro} is the bilateral euro/US dollar exchange rate. The weights $x_{euro,j}$ denote the share of total consolidated euro area exports going to country (region) j and the weights $m_{j,euro}$ denote the share of total imports of country j coming from the consolidated euro area.

2.2 THE IMPORT SIDE

The two main determinants of a country's imports are domestic demand and its competitiveness position relative to other countries competing on the domestic market. Import competitiveness is measured as the relative price between domestic and import prices, both measured in a common currency. Higher domestic prices, compared to import prices, decrease a country's import competitiveness. Import prices, in domestic

currency, are determined by domestic prices, foreign or competitors' prices, measured in foreign prices, (*CMUD*), and oil prices. Competitors' prices are computed as a weighted average of trading partners' export prices. Finally, a nominal effective exchange rate (*EENM*) is used to translate foreign prices into euro. This rate is a weighted average of the bilateral exchange rates of trading partners. These variables (*CMUD*, *EENM*) are computed for each EU27 country and for the consolidated euro area.

2.2.1 COMPETITORS' PRICES

The index of competitors' prices on the import side of country k measured in US dollars, is obtained as a simple weighted average of competitors' export prices:

$$\log[CMUD_k(t)] = \sum_j m_{k,j}(t) \cdot \log[XTUD_j(t)] \quad (2.15)$$

where $XTUD_j$ is the export deflator expressed in US dollars for country j , $m_{k,j}$ is the share of total imports of country k coming from country j . It is worth noting that, since our geographical coverage of imports does not contain many oil exporting countries, the import prices of oil and other raw materials are not fully taken into account by this measure.

We can decompose competitors' prices on the import side, for country k , into intra and extra-euro area components:

$$\log[CMUD_k^{intra}(t)] = \sum_{j \in \text{euro area}} m_{k,j}^{in}(t) \cdot \log[XTUD_j(t)]$$

$$\log[CMUD_k^{extra}(t)] = \sum_{j \notin \text{euro area}} m_{k,j}^{ex}(t) \cdot \log[XTUD_j(t)] \quad (2.16)$$

where $\sum_{j \in \text{euro area}} m_{k,j}^{in}(t) = 1.0$ and $\sum_{j \notin \text{euro area}} m_{k,j}^{ex}(t) = 1.0$

for a given t . The relationship between the total competitors' prices on the import side and their intra and extra-euro area components for country k is given by:

$$\log[CMUD_k(t)] = \lambda_k(t) \cdot \log[CMUD_k^{intra}(t)] + (1 - \lambda_k(t)) \cdot \log[CMUD_k^{extra}(t)] \quad (2.17)$$

where λ_k denotes the intra-euro area import weight of country k . Note that λ_k differs from ω_k , which was used in the computation of the export demand index in equation (2.4), and from ϕ_k , which was used in the computation of the index of competitors' prices on the export side in equation (2.9).

Competitors' import prices for the consolidated euro area are given by:

$$\log[CMUD_{\text{euro}}(t)] = \sum_j m_{\text{euro},j}(t) \cdot \log[XTUD_j(t)] \quad (2.18)$$

where the weight $m_{\text{euro},j}$ denotes the share of total imports from the consolidated euro area coming from country j and $XTUD_j$ denotes the export prices, measured in US dollars, of trading partner j .

Note that the competitors' prices, for country k , computed in equations (2.15-2.18) are measured in US dollars. In order to obtain the competitors' prices, for country k , denominated in euro, we need to multiply by the bilateral exchange rate between the US dollar and the domestic currency of country k :

$$\log[CMD_k(t)] = \log[EXR_k(t)] + \log[CMUD_k(t)]$$

$$\log[CMD_k^{intra}(t)] = \log[EXR_k(t)] + \log[CMUD_k^{intra}(t)]$$

$$\log[CMD_k^{extra}(t)] = \log[EXR_k(t)] + \log[CMUD_k^{extra}(t)]$$

$$\log[CMD_{\text{euro}}(t)] = \log[EXR_{\text{euro}}(t)] + \log[CMUD_{\text{euro}}(t)] \quad (2.19)$$

where EXR_k is the bilateral US dollar exchange rate for country k and EXR_{euro} is the bilateral euro/US dollar exchange rate. After the introduction of the euro, $EXR_k = EXR_{\text{euro}}$.

2.2.2 NOMINAL EFFECTIVE EXCHANGE RATE

The nominal effective exchange rate on the import side for country k is computed as follows:

$$\log[EENM_k(t)] = \log[EXR_k(t)] - \sum_{j \neq k} m_{k,j}(t) \cdot \log[EXR_j(t)] \quad (2.20)$$

where EXR_k is the bilateral US dollar exchange rate for country k and m_{kj} denotes the share of total imports of country k coming from country j .

The measure of the effective exchange rate on the import side for the consolidated euro area is computed as:

$$\log[EENM_{euro}(t)] = \log[EXR_{euro}(t)] - \sum_j m_{euro,j}(t) \cdot \log[EXR_j(t)] \quad (2.21)$$

where EXR_{euro} is the bilateral euro/US dollar exchange rate. The weights $x_{euro,j}$ denote the share of total consolidated euro area exports going to country (region) j and the weights $m_{euro,j}$ denote the share of total consolidated euro area imports coming from country j .

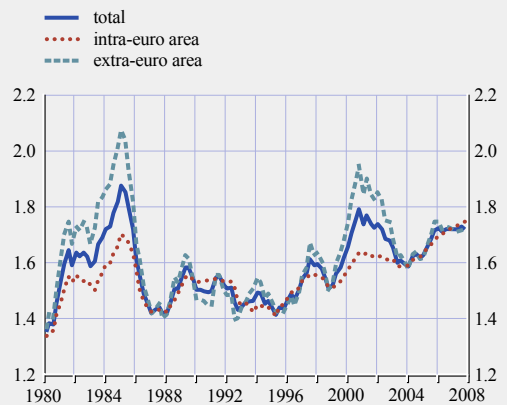
2.3 DEVELOPMENTS IN TCE VARIABLES

As mentioned above, the TCE variables, including their intra and extra-euro area components described above in Sections 2.1 and 2.2 (*WDR*, *CXD*, *EENX*, *CMD*, and *EENM*), are computed for each EU27 country. In Charts 1-4 below, we present the TCE variables in *levels* for a single country (Germany) for the period Q1 1980-Q4 2007.

Chart 1 presents the total export demand index, as well as its intra and extra-euro area

Chart 2 Index of competitors' prices on the export side (CXD) for Germany

(1980-2007; euro; levels; 1995=1.0)

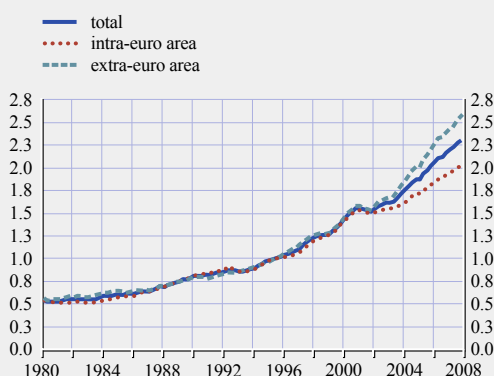


Source: ECB staff calculations.

components. Since around 2001, the much faster growth of extra-euro area export demand is clearly visible. Chart 2 shows competitors' prices on the export side, measured in euro. Next, Chart 3 shows competitors' prices on the import side, measured in euro. Finally, Chart 4 presents the nominal effective exchange rates on the import and export side. An increase in the nominal effective exchange rate indicates a depreciation. As can be seen, these two nominal effective exchange rates show very similar developments.

Chart 1 Germany's export demand index (WDR) over the period 1980-2007

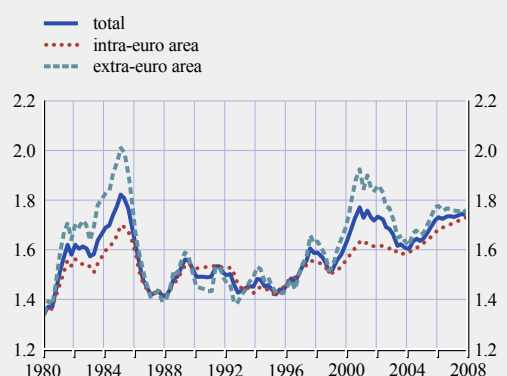
(levels; 1995=1.0)



Source: ECB staff calculations.

Chart 3 Index of competitors' prices on the import side (CMD) for Germany

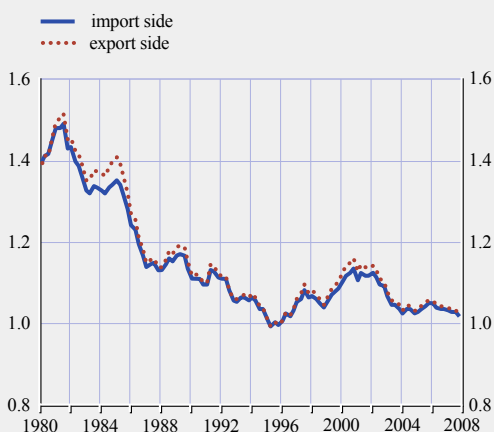
(1980-2007; euro; levels; 1995=1.0)



Source: ECB staff calculations.

Chart 4 German nominal effective exchange rates on the import and export side (EENM, EENX)

(1980-2007; indices; levels; 1995=1.0)



Source: ECB staff calculations.

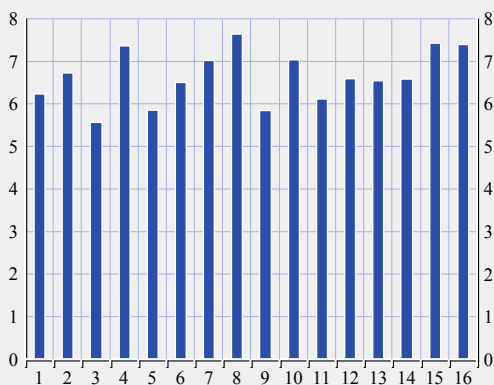
Another way to illustrate the developments in the TCE variables is to make a cross-country comparison in terms of growth rates. In Charts 5-15 we present a comparison across all euro area countries in terms of average annual growth rates for the period 1999-2007, for all TCE variables.

Charts 5-7 present total, intra and extra-euro area export demand growth rates. Average total export demand, shown in Chart 5, had an (unweighted) average annual growth rate of 8.8% over the period 1999-2007. As is immediately obvious from a comparison between Chart 6 and Chart 7, extra-euro area export demand has grown considerably faster (11.3%) than intra-euro area export demand (6.7%), reflecting the integration of fast-growing emerging markets into the global economy during the last decade.

In Charts 8-10, we present total and intra and extra-euro area competitors' prices on the export side, measured in euro. The average annual increase of competitors' prices on the export side (Chart 8) amounts to 1.5%. On average, intra-euro area prices, shown in Chart 9, grew at 1.5%, roughly the same rate as extra-euro area prices (1.4%), which are presented in Chart 10. Slovenia is an outlier, as its competitors' prices increased much more than those for the other countries. This is due to the fact that Slovenia only joined the euro area in 2007, and that before then its exchange rate had been depreciating against the euro for quite some time, in contrast to the situation in

Chart 5 Euro area countries' total export demand index (WDR)

(1999-2007; average annual growth rates; percentages)

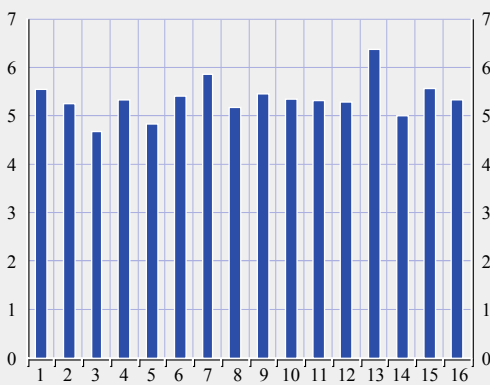


1 Belgium	7 Italy	13 Portugal
2 Germany	8 Cyprus	14 Slovenia
3 Ireland	9 Luxembourg	15 Slovakia
4 Greece	10 Malta	16 Finland
5 Spain	11 Netherlands	
6 France	12 Austria	

Source: ECB staff calculations.

Chart 6 Euro area countries' intra-euro area export demand index (WDRIN)

(1999-2007; average annual growth rates; percentages)

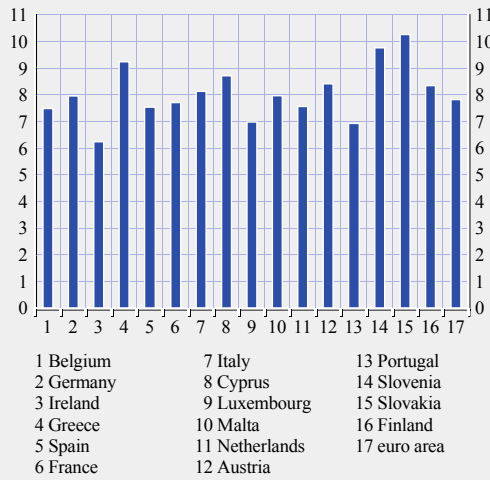


1 Belgium	7 Italy	13 Portugal
2 Germany	8 Cyprus	14 Slovenia
3 Ireland	9 Luxembourg	15 Slovakia
4 Greece	10 Malta	16 Finland
5 Spain	11 Netherlands	
6 France	12 Austria	

Source: ECB staff calculations.

Chart 7 Euro area countries' extra-euro area export demand index (WDREX)

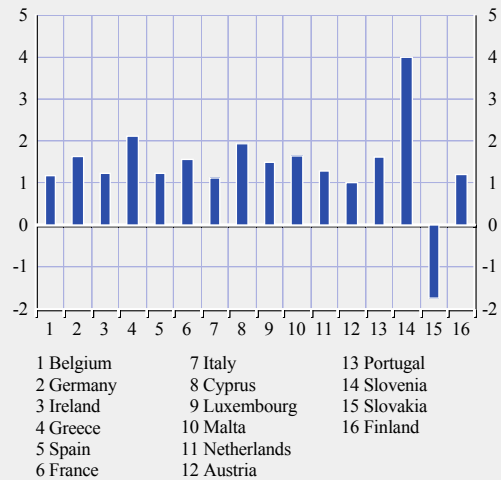
(1999-2007; average annual growth rates; percentages)



Source: ECB staff calculations.

Chart 9 Intra-euro area competitors' prices on the export side (CXDIN) for the euro area countries

(1999-2007; euro; average annual growth rates)



Source: ECB staff calculations.

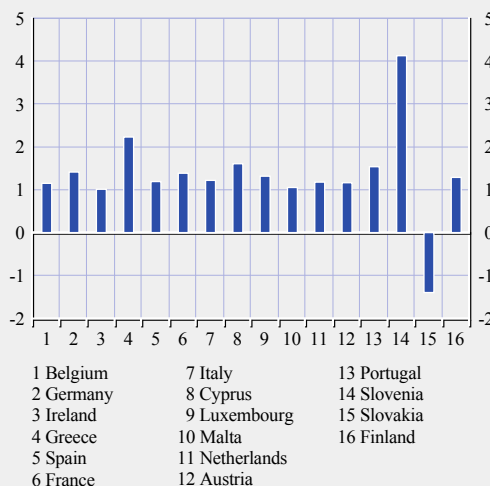
Malta and Cyprus. Slovakia, which joined the euro area on 1 January 2009, is the only country whose competitors' export prices decreased, due to the appreciation of the Slovak koruna. The developments in competitors' prices on the export side will be compared with those in the export prices of the euro area countries

in Sections 3 and 4 below, in order to obtain a measure of export competitiveness.

Charts 11-13 show total and intra and extra-euro area competitors' prices on the import side, measured in euro. The average annual increase of competitors' prices on the

Chart 8 Total competitors' prices on the export side for the euro area countries (CXD)

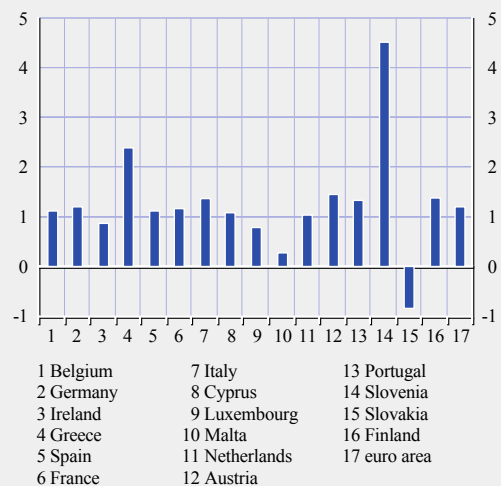
(1999-2007; euro; average annual growth rates; percentages)



Source: ECB staff calculations.

Chart 10 Extra-euro area competitors' prices on the export side (CXDEX) for the euro area countries

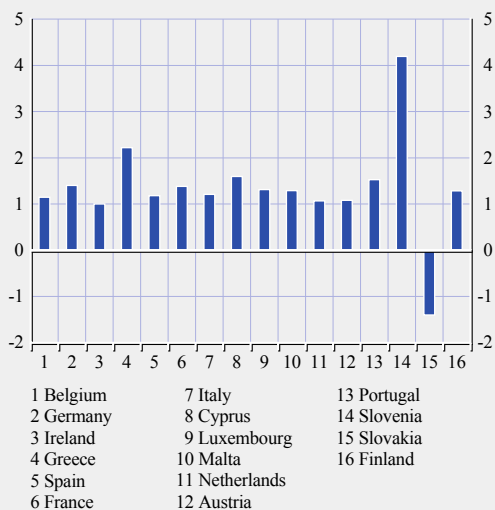
(1999-2007; euro; average annual growth rates; percentages)



Source: ECB staff calculations.

Chart 11 Total competitors' prices on the import side (CMD) for the euro area countries

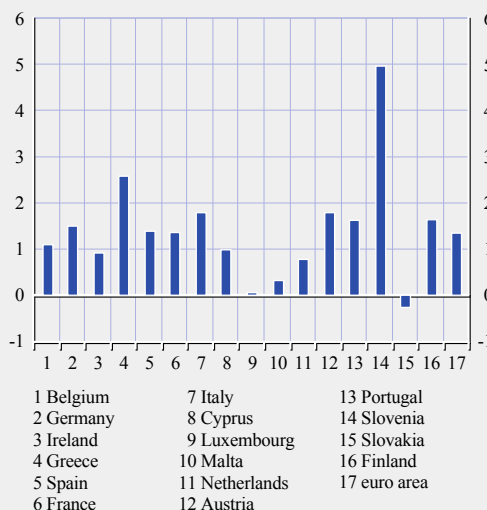
(1999–2007; euro; average annual growth rates; percentages)



Source: ECB staff calculations.

Chart 13 Extra-euro area competitors' prices on the import side (CMDEX) for the euro area countries

(1999–2007; euro; average annual growth rates; percentages)



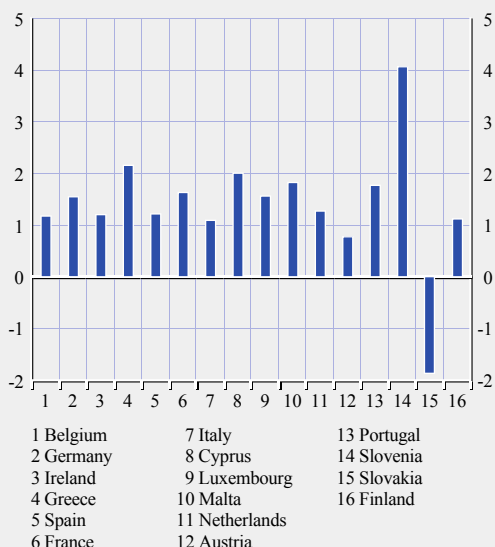
Source: ECB staff calculations.

import side (Chart 11) amounts to 1.5%, which is the same as the growth rate for the intra-euro area component, shown in Chart 12, and the extra-euro area component, presented in

Chart 13. As can be seen by comparing with Charts 8–10, the developments in competitors' prices on the export and import sides are quite similar.

Chart 12 Intra-euro area competitors' prices on the import side (CMDIN) for the euro area countries

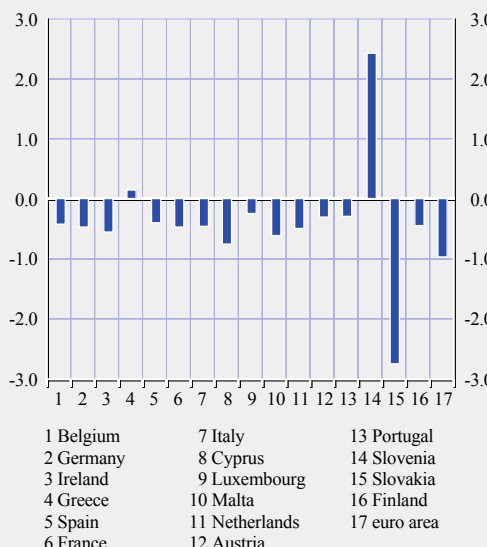
(1999–2007; euro; average annual growth rates; percentages)



Source: ECB staff calculations.

Chart 14 Nominal effective exchange rate on the export side (EENX) for the euro area countries

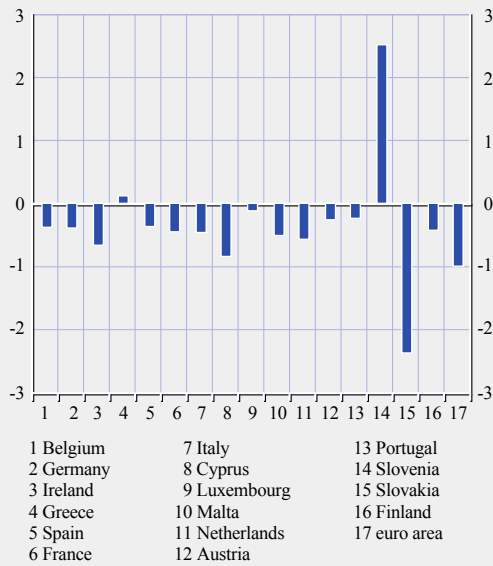
(1999–2007; average annual growth rates; percentages)



Source: ECB staff calculations.

Chart 15 Nominal effective exchange rate on the import side (EENM) for the euro area countries

(1999-2007; average annual growth rates)



Source: ECB staff calculations.

Finally, Charts 14-15 present the *nominal effective exchange rates on the export side* (Chart 14) *and on the import side* (Chart 15). The two measures are very similar for all countries. Generally, the change in the nominal effective exchange rate for a given euro area country is a function of the degree of overall extra-euro area openness and of the specific geographic trade pattern of that country. All countries, except Greece and Slovenia, experienced, on average, an appreciation over the period 1999-2007. The (unweighted) average rate of appreciation was 0.3% per year. The nominal effective exchange rate for the consolidated euro area appreciated, on average, by 0.9% per year over the period 1999-2007.

3 TRADE CONSISTENCY

In this section we introduce some concepts that are used in the trade consistency exercise analysis. We distinguish between two different aspects of the analysis. First, there is the *cross-trade consistency* analysis, described in Section 3.1 below, which basically deals with the consistency of trade flows and competitiveness across countries at a given point in time. The second part is the *ex-ante/ex-post trade consistency*, discussed in Section 3.2, which refers to the consistency of projections with given assumptions about trade flows and prices.

A couple of remarks regarding these two components of the trade consistency exercise are in order. Whereas the cross-trade consistency analysis is concerned with economic concepts like export market shares and competitiveness, the *ex ante/ex post trade consistency* analysis is a purely technical consistency requirement, without any economic interpretation per se. Furthermore, the two components are in principle independent of each other. Thus, fulfilment of the conditions for cross-trade consistency to hold, in no way implies that ex ante/ex post consistency will also hold. That would only be the case if the forecasts were prepared in the context of a multi-country model with full and consistent trade linkages.

Clearly, the trade forecast for a given country cannot be viewed in isolation from the rest of the country projection. Thus, the TCE exercise should provide a cross-country overview, without going into too much detail, and identify major inconsistencies, which in turn must be addressed in the country projection.

3.1 CROSS-TRADE CONSISTENCY

Cross-trade consistency addresses the issue of whether the trade forecasts for different countries are mutually consistent at a given point in time. We investigate to what extent each country's forecasts for real exports, import prices and export prices deviate from the developments in its commercial partners. The results provide a benchmark for the evaluation of country trade forecasts.

For real exports, we examine whether each country's real export growth is consistent with the import growth of its trading partners, i.e. the export market growth. This fairly mechanical procedure is based on the fact that country *i*'s real export growth equals the import growth of all its trading partners multiplied by the share of total exports of country *i* going to each country *j*. In other words, export growth is assumed to be entirely determined by the growth of world demand or export markets, while the effect of competitiveness is disregarded.

Competitors' prices on the export and the import side, for a given country, are computed as a weighted sum of the export prices of its partner countries. Just as in the case of export volumes, competitors' export and import prices are compared with projected domestic export and import prices for each country in order to assess the impact on import and export competitiveness.

The final part of the cross-trade consistency assessment involves decomposing import prices, measured in domestic currency, into foreign non-energy and energy prices, domestic prices and the exchange rate according to long-run relationships. This provides a rough benchmark against which the actual projections of import prices in the different countries can be evaluated.

Cross-trade consistency has been achieved when (i) projected real exports are expected to grow roughly in line with world demand or deviations can be explained by changes in competitiveness and (ii) projected export and import prices imply "reasonable" profiles for export and import competitiveness.

3.1.1 EXPORT MARKET SHARES

In the context of the cross-trade consistency exercise, we are interested in whether a country's real export growth is in line with the growth of imports of its trading partners, i.e. the growth of export markets. Let us therefore define the export market share of country *k*, as follows:

$$XSHAR_k(t) = \frac{XTR_k(t)}{WDR_k(t)} \quad (3.1)$$

This indicator of export performance measures the gap between country k 's actual exports (XTR_k) and its potential export market (WDR_k). The percentage change in this indicator reflects a gain or loss of export market share.⁵

Similarly, one could have defined the intra and extra-euro area components of total export market shares, but a lack of official ESA-95 data for the intra/extra-euro area breakdown of trade volumes and prices currently prevents us from performing this exercise.

Comparing the growth of projected exports and export markets (imports) can be rationalised as follows. If $XTUN_{k,j}(t)$ denotes nominal exports in US dollars from country k to country j in period t then, by definition, country k 's exports are:

$$\begin{aligned} XTUN_k(t) &\equiv \sum_j XTUN_{k,j}(t) \\ &\equiv \sum_j \left[\frac{XTUN_{k,j}(t)}{MTUN_j(t)} \right] \cdot MTUN_j(t) \\ &\equiv \sum_j m_{k,j}(t) \cdot MTUN_j(t) \end{aligned} \quad (3.2)$$

where $XTUN_k(t)$, are nominal exports in US dollars, $MTUN_j(t)$, are nominal imports in US dollars and $m_{k,j}(t)$ are the nominal market shares at time t , with the property that $\sum_k m_{k,j}(t) = 1.0$. If we treat the nominal market shares as being constant over time, then equation (3.2) ceases to hold. With constant shares, the expression $\sum_j m_{k,j} \cdot MTUN_j(t)$

does not give the actual nominal exports of country k , but rather what nominal exports would be if the nominal market shares were equal to those of the base year. In order to restore the identity we can re-write (3.2) as:

$$XTUN_k(t) \equiv \sum_j m_{k,j} \cdot \left[\frac{m_{k,j}(t)}{m_{k,j}} \right] \cdot MTUN_j(t) \quad (3.3)$$

In order to focus on export and import quantities, we re-write (3.3) as:

$$\begin{aligned} XTUN_k(t) &\equiv XTUD_k(t) \cdot XTUR_k(t) \\ &\equiv \sum_j m_{k,j} \cdot \left[\frac{m_{k,j}(t)}{m_{k,j}} \right] \cdot MTUD_j(t) \cdot MTUR_j(t) \end{aligned} \quad (3.4)$$

which implies:

$$XTUR_k(t) \equiv \sum_j m_{k,j} \cdot \left[\frac{m_{k,j}(t)}{m_{k,j}} \right] \cdot \left[\frac{MTUD_j(t)}{XTUD_k(t)} \right] \cdot MTUR_j(t) \quad (3.5)$$

Equation (3.5) provides a relationship between any individual country's real exports and the real imports of its trading partners. If we assume that trade shares are constant over time and export and import prices are equal, then we can express the real exports of country k as:

$$XTUR_k(t) \equiv \sum_j m_{k,j} \cdot MTUR_j(t) \quad (3.6)$$

Note that equation (3.6) is similar to our earlier definition of the export demand index (see equation (2.1) above) the difference being that the latter is defined as a geometric average.

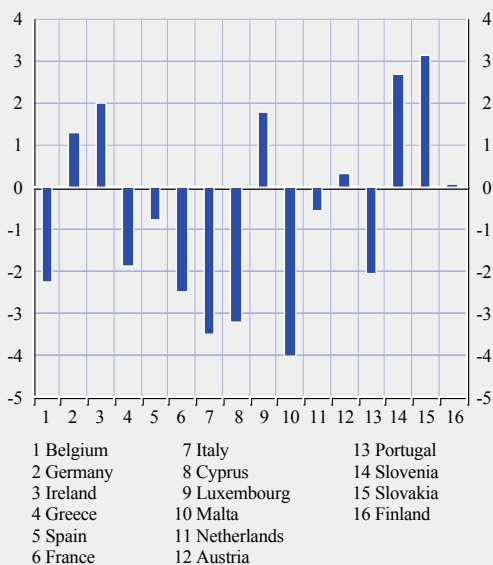
3.1.2 DEVELOPMENTS IN EXPORT MARKET SHARES

Charts 16 and 17 present total export market shares, as defined in equation (3.1), in two different ways. Chart 16 shows the *average annual percentage change* in total export market shares for all euro area countries, while in Chart 17 we plot export market shares over the period from 1999 (when they took the value 100) to 2007. An increase in the variable indicates a gain in export market share. We can identify three groups of countries, according to how their export market shares changed. First, we have a group of countries, consisting of Germany, Ireland, Luxembourg, Slovenia and Slovakia, which

⁵ For similar measures of export performance, see Durand et al. (1992).

Chart 16 Total export market shares (XTR/WDR) of euro area countries

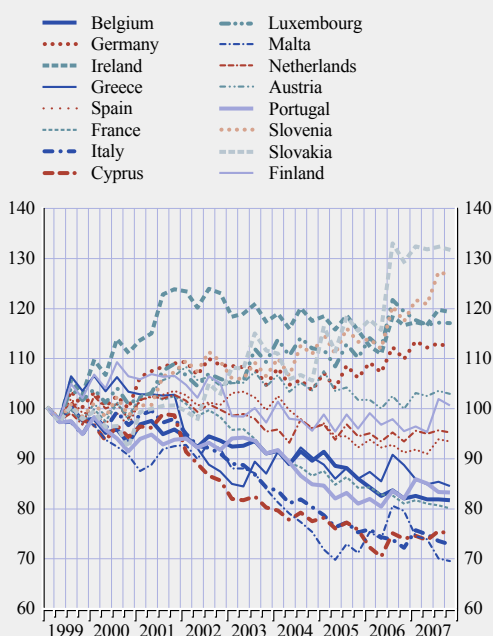
(1999-2007; average annual growth rates)



Source: ECB staff calculations.

Chart 17 Total export market shares (XTR/WDR) of euro area countries

(1999-2007; levels; Q1 1999=100)



Source: ECB staff calculations.

gained market share. A second group, consisting of Spain, the Netherlands, Austria and Finland, had market shares in 2007 that were more or less unchanged from 1999. Third, the remaining countries, in particular Italy, Malta and Cyprus, lost market share over this period.

3.1.3 EXPORT COMPETITIVENES

The approach described above for evaluating export growth is fairly mechanical and assumes that exports are entirely determined by the growth of export markets, without explicitly accounting for relative prices. Obviously, the accuracy of the implied prediction of export growth depends on the validity of the assumptions regarding the constancy of nominal trade shares and the equality of export and import prices.

It is widely recognised that the concept of competitiveness encompasses a large variety of factors in addition to changes in nominal exchange rates, relative prices and production costs. Product differentiation, reliability and quality, after-sales service and delivery times are also important factors in determining the competitive position of a particular country.⁶

The export competitiveness of country k is defined as the ratio between domestic export prices (XTD_k) and competitors' export prices (CXD_k), both expressed in a common currency:

$$XCOMP_k(t) = \frac{XTD_k(t)}{CXD_k(t)} \quad (3.7)$$

The (percentage) change in $XCOMP_k$ reflects a gain or loss of export competitiveness.⁷

3.1.4 DEVELOPMENTS IN EXPORT COMPETITIVENESS

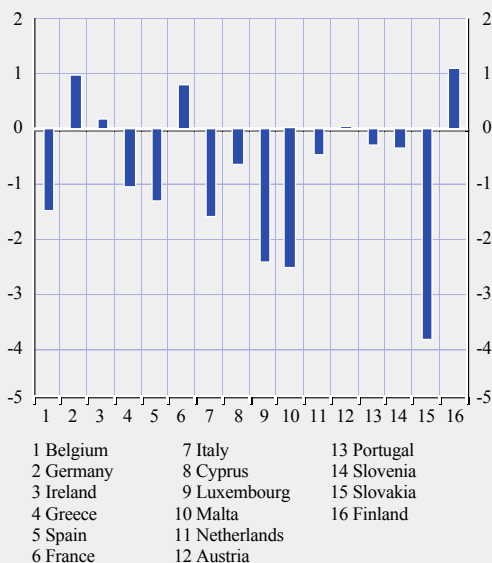
Charts 18 and 19 present total export competitiveness, as defined in equation (3.7), in

6 For a comprehensive treatment of euro area trade and competitiveness, see Anderton et al. (2004), Baumann and di Mauro (2007), di Mauro and Forster (2008) and ECB Monetary Policy Committee (2005).

7 For details on the method of calculation, see also Durand et al. (1998), Esteves and Reis (2006), Marsch and Tokarick (1994), McGuirk (1987) and Turner and Van't dack (1993).

Chart 18 Euro area countries' export competitiveness (CXD/XTD)

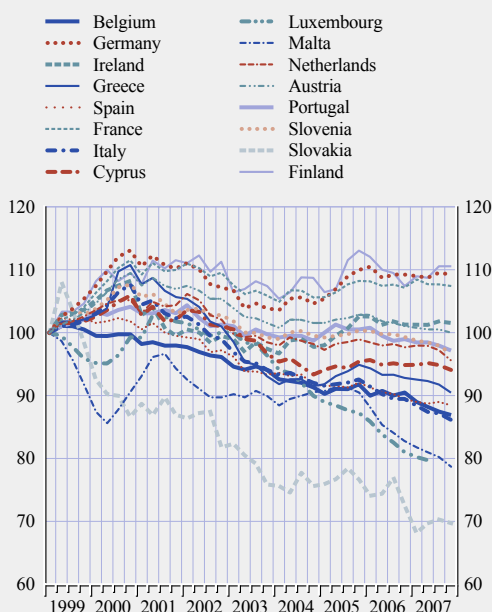
(1999-2007; average annual growth rates)



Source: ECB staff calculations.

Chart 19 Euro area countries' export competitiveness (CXD/XTD) (1999-2007)

(1999-2007; levels; Q1 1999:1=100)



Source: ECB staff calculations.

two different ways. Chart 18 shows the *average annual percentage change* in total export competitiveness for all euro area countries, while in Chart 19 we plot export competitiveness over the period from 1999, when it takes the value 100, to 2007.⁸ An increase in this variable indicates a gain in export competitiveness. As in the case of export share developments, we can identify three groups of countries according to the developments in their total export competitiveness. First, we have a group of countries, consisting of Germany, France, and Finland, which improved their export competitiveness. A second group, consisting of Ireland, the Netherlands, Austria, Portugal and Cyprus, had more or less unchanged export competitiveness in 2007, compared to 1999. Third, the remaining countries, in particular Italy, Luxembourg and Malta, experienced a deterioration in export competitiveness over this period.⁹

Clearly, the degree to which a change in the euro exchange rate affects national export competitiveness is closely related to the share of extra-euro area trade. The share of extra-euro area trade is lowest for Luxembourg (24.8%) and highest for Cyprus (73.0%). In addition, the exact geographical allocation of extra-euro area trade also matters.

3.1.5 EXPORT MARKET SHARES AND COMPETITIVENESS – AN EXAMPLE

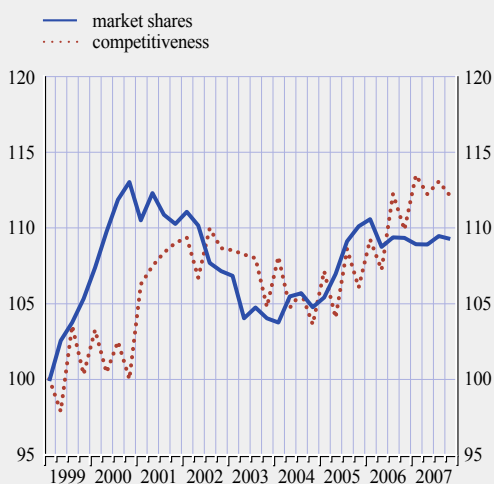
In Charts 20 and 21, we take a closer look at Germany and Italy, two polar cases with respect to the developments in their export market shares and competitiveness.

⁸ Note that we are only using information on *changes* in competitors' prices. For an approach that also uses the level of prices, see Esteves et al. (2007).

⁹ The Eurosystem has recently started to publish harmonised competitiveness indicators (HCIs) on a regular basis, as a means of providing a comparable measure of individual euro area countries' price competitiveness that is also consistent with the real effective exchange rates (REERs) of the euro. See the box entitled "The introduction of harmonised competitiveness indicators for euro area countries", in the February 2007 issue of the ECB's Monthly Bulletin. It is interesting to note that according to the developments in HCIs during the period Q1 1999-Q4 2006, Germany, Austria and Finland experienced a moderate improvement in their competitiveness, whereas Spain, Ireland, Luxembourg, the Netherlands and Portugal were the countries with the most unfavourable developments.

Chart 20 Germany's export market share and competitiveness

(1999-2007; levels; Q1 1999 = 100)

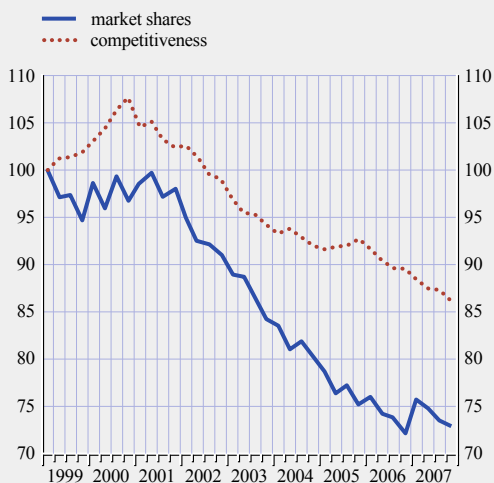


Source: ECB staff calculations.

An increase in the index indicates a gain in market share (competitiveness). As can be seen from these two charts, there is a clear positive correlation between the two curves for both countries. Improved export competitiveness in Germany is associated with a gain in market

Chart 21 Italy's export market shares and competitiveness

(1999-2007; levels; Q1 1999 = 100)



Source: ECB staff calculations.

share and a loss of competitiveness for Italy is associated with a loss of market share.¹⁰

3.2 EX ANTE/EX POST TRADE CONSISTENCY¹¹

At the beginning of each projection exercise a number of technical assumptions are decided upon, some of which concern trade developments. On the basis of these assumptions an initial set of export demand and competitors' prices is computed, as described in Section 2 above. These measures are then used in the national macroeconomic models employed in the projection exercise.

For ex ante/ex post trade consistency to be satisfied it is thus necessary that the export demand (aggregate imports), which is one of the assumptions made at the beginning of the forecast exercise, be validated by the projected export demand (aggregate imports) that results from the forecasting exercise.

Whereas the cross-trade consistency analysis is concerned with the mutual consistency between the projected trade flows of individual countries at a given point in time, the *ex-ante/ex-post* trade consistency analysis investigates to what extent the measures of export demand and competitiveness, which are given at the beginning of the forecast round, deviate from the corresponding measures resulting from the projection iterations. Thus, this analysis aims at ensuring consistency over time of the assumptions regarding trade.

The same kind of consistency analysis is performed with regard to competitors' prices as for world demand. The competitors' prices facing each country, on both the import side and the export side, are a function of the export deflators of all its trading partners, both inside and outside the euro area. Thus, in successive rounds of the forecast, the euro area trade prices will be updated and new measures of competitors' prices will be calculated.

¹⁰ See Appendix A for a cross-country comparison of the correlation between export competitiveness and export market shares.

¹¹ The *ex-ante/ex-post-consistency* requirement was originally proposed by Banca d'Italia, (1998).

Convergence with regard to *ex ante/ex post* trade consistency has been achieved when the differences between successive values of world demand and competitors' prices are small enough to be of no practical importance. Depending on the results of the trade consistency analysis, additional forecast rounds or iterations could be required.

3.2.1 EXPORT DEMAND

For each country, the export demand index is a function of imports of the euro area countries and of the rest of the world. If we denote the beginning of the projection exercise by t_0 , we have the following relationship for the export demand index for country k :

$$\begin{aligned} \log[WDR_k(t_0)] = & \sum_{j \in \text{euro area}} x_{k,j}^{\text{in}}(t) \cdot \log[MTR_j(t_0)] \\ & + \sum_{j \notin \text{euro area}} x_{k,j}^{\text{ex}}(t) \cdot \log[MTR_j(t_0)] \end{aligned} \quad (3.8)$$

The first term on the right-hand side of (3.8) is intra-euro area export demand, which is a function of the real imports of the euro area countries, $MTR_j(t_0)$. Imports of the euro area countries are obviously endogenous in the projection exercise. The second term is the extra-euro area component of export demand, which is treated as exogenous in the projection exercises.

Next, $WDR_k(t_0)$ is used as an input in the different national models and, most importantly, is treated as exogenous in each model block. After the first round of the forecast exercise has been completed, a new predicted or simulated value of imports for each euro area country will emerge, which we denote $MTR_j(t_1)$. Taking the new import forecasts into account, the export demand index, for each country, is now given by:

$$\begin{aligned} \log[WDR_k(t_1)] = & \sum_{j \in \text{euro area}} x_{k,j}^{\text{in}}(t) \cdot \log[MTR_j(t_1)] \\ & + \sum_{j \notin \text{euro area}} x_{k,j}^{\text{ex}}(t) \cdot \log[MTR_j(t_1)] \end{aligned} \quad (3.9)$$

If the $WDR_k(t_1)$, differ from those calculated at the start of the exercise, i.e. $WDR_k(t_0)$, this means that the starting guess for export

demand is not consistent with the behavioural mechanisms that determine imports and exports in the national models. To solve this problem an iterative procedure is required: if $WDR_k(t_1) \neq WDR_k(t_0)$ then $WDR_k(t_1)$ must be read into all the national models, and new national projections produced. Convergence is reached when $WDR_k(t_{i+1}) = WDR_k(t_i)$ or when the difference between successive iterations is not considered to be of any practical importance, for each country.

3.2.2 COMPETITORS' PRICES

Exactly the same kind of *ex ante/ex post* trade consistency analysis is applied to competitors' prices both on the import and on the export side. Competitors' prices, for each country, are a function of the export deflators of all its trading partners. Thus at time $t = t_0$ we have:

$$\begin{aligned} \log[CXUD_k(t_0)] = & \sum_{j \in \text{euro area}} \beta_{k,j}^{\text{in}}(t) \cdot \log[XTUD_j(t_0)] \\ & + \sum_{j \notin \text{euro area}} \beta_{k,j}^{\text{ex}}(t) \cdot \log[XTUD_j(t_0)] \end{aligned} \quad (3.10)$$

$$\begin{aligned} \log[CMUD_k(t_0)] = & \sum_{j \in \text{euro area}} m_{k,j}^{\text{in}}(t) \cdot \log[XTUD_j(t_0)] \\ & + \sum_{j \notin \text{euro area}} m_{k,j}^{\text{ex}}(t) \cdot \log[XTUD_j(t_0)] \end{aligned} \quad (3.11)$$

The first term on the right-hand side of equations (3.10) and (3.11) sums over countries belonging to the euro area (endogenous), whereas the second term refers to countries outside the euro area, which are treated as exogenous in the projections. Thus, in successive rounds of the forecast the first term will be updated and successive iterations will be compared until convergence has been achieved.

Note, that there is no corresponding *ex ante/ex post* consistency requirement for the nominal effective exchange rates (*EENX* and *EENM*), since there is no endogenous component, given that nominal exchange rates are treated as exogenous in the projection exercises.

4 DATA

This section describes the underlying data series and trade weights used in the computation of the foreign trade indicators (*WDR*, *CXD*, *EENX*, *CMD*, and *EENM*) introduced in Section 2 above. Section 4.1 describes their geographical coverage and in Section 4.2 we discuss the different set of trade weights used.

4.1 GEOGRAPHICAL COVERAGE

The different country/region coverage of variables used for the computation of the TCE variables, presented in Table 1, is mainly determined by the availability of timely and reliable data. This is the reason for the somewhat different geographical coverage of the imports that enter export demand (*WDR*) and of the export prices that enter competitors' prices

Table 1 Data required for the TCE

Country	XTR	XNR	XXR	XTD	XND	XXD	MTR	MTD	YED	EXR	POILU	PCOM
Belgium	X	X	X	X	X	X	X	X	X			
Germany	X	X	X	X	X	X	X	X	X			
Ireland	X	X	X	X	X	X	X	X	X			
Greece	X	X	X	X	X	X	X	X	X			
Spain	X	X	X	X	X	X	X	X	X			
France	X	X	X	X	X	X	X	X	X			
Italy	X	X	X	X	X	X	X	X	X			
Cyprus	X	X	X	X	X	X	X	X	X			
Luxembourg	X	X	X	X	X	X	X	X	X			
Malta	X	X	X	X	X	X	X	X	X			
Netherlands	X	X	X	X	X	X	X	X	X			
Austria	X	X	X	X	X	X	X	X	X			
Portugal	X	X	X	X	X	X	X	X	X			
Slovenia	X	X	X	X	X	X	X	X	X			
Slovakia	X			X			X	X		X		
Finland	X	X	X	X	X	X	X	X	X			
Euro area										X	X	X
Bulgaria	X			X			X	X		X		
Czech Republic	X			X			X	X		X		
Denmark	X			X			X	X		X		
Estonia	X			X			X	X		X		
Latvia	X			X			X	X		X		
Lithuania	X			X			X	X		X		
Hungary	X			X			X	X		X		
Poland	X			X			X	X		X		
Romania	X			X			X	X		X		
Sweden	X			X			X	X		X		
United Kingdom	X			X			X	X		X		
Switzerland				X			X			X		
Japan				X			X			X		
United States				X			X			X		
Norway				X			X			X		
Canada				X			X			X		
Australia				X			X			X		
New Zealand				X			X			X		
CIS countries							X					
Latin America							X					
Asia, non-Japan							X					
Rest of world							X					
China				X						X		
Hong Kong				X						X		
South Korea				X						X		
Singapore				X						X		

(*CXD* and *CMD*) and nominal effective exchange rates (*EENX* and *EENM*). The geographical coverage of countries and regions amounts to 85-95% of the trade of individual euro area countries and of the euro area as a whole. The time series required for the TCE analysis are denoted by a cross in the table.

A. Series used for the computation of TCE variables:

- Input series for export demand (*WDR*):
MTR – total real imports;
- Input series for competitors' prices (*CXD* and *CMD*):
XTD – total export deflator in domestic currency;
- Input series for nominal effective exchange rates (*EENX* and *EENM*):
EXR – bilateral exchange rate against the US dollar.

B. Other series used in the TCE analysis:

- Export side:
XTR – total real exports;
XNR (XXR) – intra-euro area (extra-euro area) real exports;
XND (XXD) – intra-euro area (extra-euro area) export deflator in domestic currency;
- Import side:
MTD – total import deflator in domestic currency;
YED – GDP deflator in domestic currency;
POILU – oil prices in US dollars;
PCOMU – commodity prices in US dollars.

4.2 TRADE SHARES

Trade shares between two countries are defined as bilateral trade flows (i.e. exports or imports) divided by a country's total trade. The different trade shares used are explicitly

defined in Sections 4.2.1-4.2.3 below. In order to reduce the influence of temporary factors on the trade shares, we employ a three-year moving average until 2005 and thereafter the shares take the value of the latest observation. Thus, the trade shares are constant over the projection horizon.

The trade shares are based on nominal trade flows of goods taken from the IMF Direction of Trade Statistics (DOTS) database. The database contains data on bilateral trade at a country level and at various levels of aggregation, e.g. Asia and Europe. The aggregations were created by simply adding the trade flows of the countries of the aggregates. The “rest of the world” category is calculated as the world aggregate, as given in the DOTS database, minus all the countries or regions specifically considered.

4.2.1 EXPORT SHARES

In Table 2 below the export shares are presented for all EU27 countries. Each set of weights, i.e. each column of the table reflects the particular trade structure of each country. The element denotes $x_{k,j}$ the share of total exports of country k going to country j , where $\sum_j x_{k,j} = 1.0$. The element

$x_{AT,DE} = 32.5$ implies that 32.5% of total Austrian exports go to Germany. The geographical distribution of exports clearly differs among countries. First, the share of intra-euro area trade ranges from a low of 27.0% for Cyprus to a high of 75.2% for Luxembourg. We can also identify the existence of high trade weights between countries with strong traditional trade links, e.g. 32.5% of Austrian exports go to Germany and 20.4% of Irish exports go to the United Kingdom. These export shares are used in the computation of the export demand index (*WDR*) (see equations 2.1-2.3 in Section 2 above).

Table 2 Average export shares (%) used in WDR

(2003-2005)															
<i>Exports from country k</i>															
<i>To country j</i>	BE	DE	IE	GR	ES	FR	IT	CY	LU	MT	NL	AT	PT	SI	SK
Belgium	0.0	5.1	12.4	1.5	2.9	7.2	2.9	1.8	11.2	2.8	12.5	1.6	4.6	1.1	1.8
Germany	19.2	0.0	8.8	13.6	12.1	15.4	14.3	3.7	23.8	11.3	25.7	32.5	16.3	27.8	31.4
Ireland	0.8	0.6	0.0	0.4	0.6	0.8	0.6	0.7	0.6	0.3	1.0	0.4	0.6	0.2	0.1
Greece	0.6	0.8	0.4	0.0	1.2	0.9	2.2	10.6	0.5	0.1	0.9	0.6	0.4	0.4	0.4
Spain	3.8	4.8	2.8	3.6	0.0	9.5	7.0	1.4	4.7	0.8	3.8	2.8	22.5	1.5	1.4
France	17.2	10.7	6.0	4.5	19.8	0.0	12.6	2.4	19.6	13.5	10.3	4.7	13.1	8.0	3.4
Italy	5.5	7.4	4.2	10.9	9.5	9.2	0.0	1.8	6.7	4.1	6.1	9.4	4.7	15.3	7.8
Cyprus	0.0	0.1	0.0	5.2	0.1	0.1	0.2	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0
Luxembourg	1.9	0.5	0.1	0.0	0.1	0.7	0.2	0.0	0.0	0.0	0.3	0.2	0.1	0.2	0.1
Malta	0.0	0.0	0.0	0.8	0.1	0.2	0.3	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Netherlands	11.9	6.2	4.6	2.9	3.4	3.9	2.5	2.7	4.4	0.9	0.0	2.3	3.9	1.9	2.5
Austria	1.1	5.3	0.4	0.9	0.9	1.0	2.3	0.7	1.5	0.1	1.5	0.0	0.7	9.9	8.5
Portugal	0.7	1.0	0.4	0.7	10.0	1.8	1.3	0.3	0.9	0.3	0.9	0.5	0.0	0.2	0.2
Slovenia	0.1	0.4	0.0	0.3	0.3	0.3	0.9	0.3	0.2	0.1	0.1	1.8	0.0	0.0	0.9
Slovakia	0.2	0.7	0.0	0.2	0.3	0.2	0.4	0.4	0.1	0.1	0.2	1.4	0.1	1.6	0.0
Finland	0.5	1.0	0.4	0.7	0.4	0.5	0.5	0.2	1.0	0.5	1.1	0.6	0.5	0.3	0.4
Intra-euro area	63.3	44.0	40.4	46.1	61.6	51.4	47.7	27.0	75.2	34.9	64.3	57.5	67.6	66.7	59.1
Bulgaria	0.1	0.2	0.0	6.5	0.1	0.1	0.3	0.9	0.0	0.0	0.1	0.4	0.1	0.5	0.3
Czech Republic	0.6	2.5	0.2	0.6	0.6	0.6	0.9	0.9	0.7	0.2	0.7	2.9	0.2	2.4	14.7
Denmark	0.8	1.7	0.6	0.9	0.7	0.8	0.8	0.6	0.9	0.2	1.4	0.7	0.9	1.1	0.6
Estonia	0.0	0.1	0.0	0.1	0.0	0.0	0.1	0.1	0.0	0.2	0.1	0.1	0.0	0.1	0.1
Latvia	0.0	0.1	0.0	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.1	0.0	0.1	0.2
Lithuania	0.1	0.2	0.0	0.1	0.1	0.1	0.2	0.1	0.1	0.0	0.1	0.1	0.0	0.3	0.2
Hungary	0.5	1.7	0.2	0.6	0.5	0.6	1.1	0.1	0.4	1.2	0.6	4.2	0.3	2.5	4.9
Poland	0.9	2.5	0.3	1.2	1.0	1.1	1.7	0.1	1.0	0.2	1.1	1.7	0.5	3.3	5.4
Romania	0.2	0.5	0.1	3.2	0.2	0.4	1.4	1.2	0.1	0.1	0.2	1.3	0.1	1.0	1.1
Sweden	1.4	2.1	1.3	1.1	1.0	1.3	1.0	0.8	1.8	0.3	2.0	1.2	1.4	1.1	0.8
United Kingdom	9.3	8.4	20.4	8.1	9.5	9.7	7.1	30.1	8.8	11.7	0.5	4.7	10.2	2.8	2.2
Switzerland	1.2	4.1	3.4	1.0	1.1	0.3	3.8	0.4	1.7	0.5	1.5	5.4	1.0	1.6	1.2
Japan	1.0	1.9	2.9	0.6	0.8	1.6	1.7	0.6	0.4	3.3	0.9	1.2	0.4	0.2	0.5
United States	6.8	9.8	18.9	6.1	4.5	7.5	9.1	2.2	2.5	16.9	4.4	5.3	5.9	3.7	2.9
Norway	0.4	0.7	0.6	0.4	0.5	0.4	0.4	0.7	0.5	0.2	0.8	0.3	0.8	0.3	0.3
Canada	0.6	0.8	0.5	0.7	0.5	0.8	0.9	0.2	0.4	0.3	0.4	0.8	0.6	0.3	0.3
Australia, New Zealand	0.5	0.7	0.9	0.7	0.5	0.6	1.0	0.2	0.2	0.1	0.4	0.6	0.5	0.3	0.1
CIS countries	0.9	2.6	0.3	4.1	0.8	1.2	2.1	4.6	0.7	0.1	1.4	2.2	0.2	5.0	2.6
Latin America	1.1	2.2	1.1	1.3	5.2	2.7	3.0	0.7	0.7	0.7	1.2	0.9	1.4	0.5	0.2
Asia, non-Japan	4.9	7.0	5.0	3.4	2.8	5.6	6.0	3.3	1.9	22.0	3.7	3.8	1.9	1.3	0.9
Rest of world	5.1	5.5	2.7	13.2	7.5	9.8	9.2	24.9	1.9	6.6	4.1	3.3	5.9	3.4	1.6
Extra-euro area	36.7	56.0	59.6	53.9	38.4	48.6	52.3	73.0	24.8	65.1	35.7	42.5	32.4	33.3	40.9
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: ECB staff calculations.

Table 2 Average export shares (%) used in WDR (cont'd)

(2003-2005)

To country j	Exports from country k											
	FI	BG	CZ	DK	EE	LV	LT	HU	PL	RO	SE	UK
Belgium	2.6	5.9	2.5	1.7	1.1	1.1	2.1	2.7	3.2	1.7	4.5	5.4
Germany	11.6	11.4	37.4	19.2	8.0	14.8	10.7	35.0	32.4	15.8	10.2	11.3
Ireland	0.6	0.2	0.5	1.5	0.6	1.2	0.4	0.5	0.3	0.2	0.5	7.2
Greece	0.8	10.9	0.4	0.8	0.2	0.1	0.4	0.5	0.3	2.7	0.5	0.7
Spain	2.6	3.5	2.1	2.9	0.6	0.7	1.4	2.6	2.0	1.8	2.9	4.5
France	4.1	5.8	4.7	5.1	1.3	2.0	4.9	5.8	6.0	7.9	5.0	9.7
Italy	3.5	16.2	4.3	3.4	1.0	2.1	2.3	6.0	5.8	24.4	3.6	4.4
Cyprus	0.1	0.5	0.0	0.1	0.3	0.1	0.6	0.0	0.1	0.2	0.1	0.2
Luxembourg	0.1	0.0	0.2	0.2	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.1
Malta	0.0	0.2	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.2	0.0	0.1
Netherlands	4.6	1.8	3.8	4.9	2.9	3.3	3.6	4.3	4.6	3.3	5.0	7.0
Austria	1.0	2.1	6.0	0.9	0.5	0.5	0.3	7.6	1.9	3.2	1.0	0.6
Portugal	0.6	0.3	0.3	0.6	0.1	0.4	0.2	0.6	0.8	0.2	0.5	0.8
Slovenia	0.1	0.4	0.6	0.1	0.0	0.1	0.0	0.9	0.3	0.5	0.1	0.1
Slovakia	0.2	0.3	8.1	0.1	0.1	0.4	0.1	1.8	1.6	0.3	0.2	0.1
Finland	0.0	0.2	0.4	3.1	23.5	2.5	1.3	1.0	0.7	0.1	5.7	0.8
Intra-euro area	32.4	59.4	63.4	44.6	40.5	29.0	28.2	67.6	58.6	62.3	39.9	52.8
Bulgaria	0.1	0.0	0.3	0.1	0.0	0.0	0.1	0.4	0.2	1.7	0.1	0.1
Czech Republic	0.5	0.6	0.0	0.5	0.4	0.5	0.5	2.3	4.1	0.5	0.5	0.6
Denmark	2.3	0.5	0.6	0.0	3.4	5.8	4.8	0.7	2.5	0.2	6.3	1.2
Estonia	2.6	0.1	0.1	0.3	0.0	6.8	4.2	0.1	0.3	0.0	0.6	0.1
Latvia	0.7	0.1	0.2	0.3	7.8	0.0	10.5	0.1	0.7	0.0	0.3	0.1
Lithuania	0.5	0.2	0.4	0.4	4.1	8.6	0.0	0.2	2.1	0.0	0.3	0.1
Hungary	0.8	0.9	2.4	0.4	1.6	0.2	0.5	0.0	2.4	3.5	0.5	0.4
Poland	1.8	0.9	5.0	1.6	0.9	2.3	4.3	2.4	0.0	1.0	1.7	0.8
Romania	0.1	3.5	0.8	0.1	0.0	0.0	0.1	2.7	0.8	0.0	0.2	0.3
Sweden	9.6	0.6	1.2	12.6	13.4	10.2	4.3	2.9	3.3	0.6	0.0	2.1
United Kingdom	8.5	3.0	5.4	9.2	4.0	14.7	9.2	4.8	5.2	6.2	8.2	0.0
Switzerland	1.3	1.1	1.4	1.2	0.6	0.7	4.9	1.2	0.8	0.6	1.2	1.8
Japan	2.1	0.2	0.4	3.1	0.5	0.8	0.3	0.6	0.2	0.1	2.2	2.0
United States	8.3	5.2	2.7	6.4	2.5	3.5	3.8	3.7	2.5	3.7	11.3	15.9
Norway	2.6	0.1	0.4	5.7	3.0	1.8	2.1	0.2	1.8	0.7	8.6	1.0
Canada	1.0	0.5	0.2	0.8	0.3	0.4	0.7	0.2	0.4	0.3	1.2	1.8
Australia,												
New Zealand	0.9	0.1	0.1	0.9	0.1	0.1	0.0	0.2	0.1	0.0	1.2	1.4
CIS countries	8.2	4.6	2.4	1.7	12.7	10.4	17.9	2.8	7.3	2.3	1.8	1.0
Latin America	2.1	1.2	0.5	1.9	0.8	0.7	0.3	0.5	1.0	0.7	2.2	1.6
Asia, non-Japan	7.6	2.3	1.8	4.7	2.0	0.8	1.2	1.7	1.5	3.7	6.7	7.4
Rest of world	6.1	14.8	2.4	3.3	1.2	2.3	2.0	2.9	2.4	11.4	4.9	7.5
Extra-euro area	67.6	40.6	36.6	55.4	59.5	71.0	71.8	32.4	41.4	37.7	60.1	47.2
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: ECB staff calculations.

4.2.2 IMPORT SHARES

The import shares are presented in Table 3 below. The element $m_{k,j}$ denotes the share of total imports of country k coming from country j , where $\sum_j m_{k,j} = 1.0$. The element

$m_{AT,DE} = 47.2$ implies that 47.2% of total Austrian imports are of German origin. These import shares are used in the computation of competitors' prices (CMD) and the nominal effective exchange rate ($EENM$) on the import side (see equations 2.15, 2.16 and 2.20 in Section 2 above).

4.2.3 THIRD-MARKET EFFECTS

Table 4 below present the "simple" weights, corresponding to the double-weighting scheme for computing competitor's prices and the nominal effective exchange rate on the export side. These import shares are used in the computation of competitors' prices (CXD) and the nominal effective exchange rate ($EENX$) on the export side (see equations 2.7, 2.8 and 2.13 in Section 2 above).

Table 3 Average import shares (%) used in CMD and EENM

(2003-2005)															
From country j	Imports of country k														
	BE	DE	IE	GR	ES	FR	IT	CY	LU	MT	NL	AT	PT	SI	SK
Belgium	0.0	5.8	2.2	4.8	4.4	11.1	5.6	2.2	32.7	1.7	12.2	2.6	3.4	1.9	2.4
Germany	19.6	0.0	8.5	16.8	20.4	22.4	22.7	10.4	25.0	8.7	22.5	47.2	16.8	22.3	30.4
Ireland	6.5	3.1	0.0	1.1	1.7	1.7	1.8	0.9	0.5	0.7	2.0	0.6	0.8	0.4	0.3
Greece	0.1	0.3	0.1	0.0	0.3	0.2	0.7	14.9	0.0	1.1	0.2	0.1	0.2	0.4	0.2
Spain	2.2	3.5	1.3	4.8	0.0	8.2	5.8	4.8	0.9	2.9	2.6	1.3	33.2	2.9	2.9
France	14.5	10.7	4.5	8.2	20.6	0.0	14.2	7.1	13.2	16.4	6.6	4.1	11.4	11.5	4.5
Italy	4.1	7.3	2.1	16.0	10.9	10.3	0.0	12.5	2.0	25.0	3.3	7.2	7.4	20.9	7.2
Cyprus	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Luxembourg	0.7	0.4	0.1	0.3	0.3	0.9	0.5	0.0	0.0	0.0	0.3	0.2	0.3	0.3	0.1
Malta	0.0	0.1	0.0	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Netherlands	18.6	9.7	4.5	7.2	6.0	8.1	7.5	3.3	5.1	2.9	0.0	4.6	5.4	2.7	2.4
Austria	0.7	4.6	0.4	1.2	1.4	1.2	3.4	0.8	0.9	0.7	0.8	0.0	0.8	11.3	6.5
Portugal	0.8	1.1	0.3	0.3	3.8	1.7	0.6	0.5	0.2	0.4	0.6	0.2	0.0	0.2	0.2
Slovenia	0.1	0.5	0.0	0.1	0.1	0.3	0.7	0.2	0.1	0.1	0.1	1.6	0.1	0.0	1.0
Slovakia	0.1	1.3	0.0	0.2	0.2	0.1	0.6	0.2	0.1	0.1	0.2	2.1	0.1	1.6	0.0
Finland	0.7	1.2	0.6	1.4	0.9	0.7	0.8	1.3	0.1	0.1	1.2	0.8	0.6	0.6	0.6
Intra-euro area	68.6	48.3	24.7	62.8	70.9	66.8	64.4	59.0	80.7	60.8	52.4	70.6	80.4	75.2	58.8
Bulgaria	0.2	0.2	0.0	1.4	0.1	0.1	0.5	0.5	0.0	0.2	0.1	0.2	0.1	0.3	0.1
Czech Republic	0.5	3.5	0.3	0.7	0.6	0.5	0.8	0.3	1.0	0.2	0.6	3.1	0.4	2.8	20.9
Denmark	0.5	2.0	1.7	1.3	0.9	1.0	0.9	1.0	0.2	0.9	1.2	0.6	0.7	0.6	0.6
Estonia	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.0	0.0
Latvia	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.1
Lithuania	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.1
Hungary	0.7	2.6	0.3	0.6	0.5	0.6	1.0	0.4	0.2	0.2	0.7	5.2	0.2	3.5	4.0
Poland	0.8	3.2	0.3	0.5	0.7	0.8	1.3	0.3	0.3	0.2	0.9	1.2	0.9	1.7	4.7
Romania	0.2	0.6	0.1	1.4	0.2	0.4	1.8	0.5	0.0	0.2	0.2	0.9	0.1	0.8	0.3
Sweden	2.5	2.0	0.9	1.8	1.6	1.5	1.7	2.0	0.4	0.5	2.4	1.3	1.4	1.2	1.0
United Kingdom	8.3	7.3	41.5	5.5	8.1	8.4	6.1	11.2	2.9	11.0	8.9	2.4	5.7	2.5	2.5
Switzerland	0.9	4.3	1.1	1.9	1.9	3.0	4.5	1.5	1.3	1.7	1.3	5.2	1.0	1.8	1.3
Japan	3.4	4.3	3.6	4.4	2.6	2.2	2.6	7.4	1.2	3.5	5.0	1.3	2.0	1.4	1.3
United States	7.0	8.7	16.7	5.8	4.2	7.0	5.4	6.7	3.5	8.4	10.9	3.0	2.8	2.7	1.5
Norway	1.1	2.7	1.6	0.4	0.7	1.9	0.9	0.2	0.1	0.4	2.2	0.1	1.6	0.2	0.2
Canada	0.6	0.6	0.9	0.4	0.4	0.7	0.6	0.3	0.4	0.3	0.7	0.4	0.3	0.4	0.1
Australia, New Zealand	0.5	0.4	0.3	0.3	0.4	0.3	0.7	0.5	0.0	0.5	0.6	0.1	0.2	0.1	0.1
China	2.9	5.3	2.2	4.1	3.9	3.1	4.5	5.5	6.6	2.5	7.5	1.7	1.1	2.1	1.5
Hong-Kong	0.4	0.5	0.7	0.3	0.2	0.1	0.2	0.9	0.6	0.6	0.8	0.1	0.1	0.2	0.1
South Korea	0.5	1.3	1.4	6.1	1.4	0.6	1.3	1.0	0.4	1.9	1.3	0.5	0.7	0.7	0.8
Singapore	0.3	0.8	1.7	0.2	0.2	0.6	0.2	0.5	0.1	5.8	1.8	0.1	0.1	0.2	0.0
Extra-euro area	31.4	51.7	75.3	37.2	29.1	33.2	35.6	41.0	19.3	39.2	47.6	29.4	19.6	24.8	41.2
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: ECB staff calculations.

Table 3 Average import shares (%) used in CMD and EENM (cont'd)

(2003-2005)

From country j	Imports of country k											
	FI	BG	CZ	DK	EE	LV	LT	HU	PL	RO	SE	UK
Belgium	3.4	2.2	2.5	3.8	2.2	2.2	2.8	2.3	3.3	2.0	4.3	5.9
Germany	19.5	21.9	37.2	24.5	14.3	19.5	24.6	30.3	29.7	19.3	19.8	15.6
Ireland	1.2	0.4	0.7	1.3	0.7	0.6	0.5	0.6	0.6	0.6	1.7	4.6
Greece	0.3	9.2	0.2	0.3	0.1	0.2	0.5	0.2	0.3	2.0	0.2	0.3
Spain	1.8	3.0	2.2	1.8	1.1	1.4	1.8	2.1	3.1	2.3	1.7	3.9
France	5.4	8.5	5.6	5.7	3.3	3.1	5.6	5.6	8.3	8.8	6.1	9.4
Italy	4.4	15.5	6.1	4.6	4.2	4.8	6.1	8.2	9.8	25.0	3.7	5.3
Cyprus	0.0	0.1	0.0	0.0	0.0	0.1	0.8	0.0	0.1	0.0	0.0	0.1
Luxembourg	0.1	0.0	0.2	0.2	0.1	0.1	0.2	0.1	0.2	0.1	0.3	0.3
Malta	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.1
Netherlands	6.5	2.7	2.8	7.6	3.2	4.0	4.1	3.2	4.4	2.6	7.4	7.7
Austria	1.5	3.3	4.9	1.3	1.2	1.7	1.4	8.4	2.3	4.3	1.3	1.1
Portugal	0.5	0.4	0.3	0.6	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.9
Slovenia	0.1	0.9	0.7	0.2	0.2	0.3	0.5	0.7	0.7	0.6	0.1	0.1
Slovakia	0.2	1.0	6.1	0.2	0.3	0.8	0.5	2.2	1.9	1.3	0.2	0.1
Finland	0.0	0.7	0.7	2.7	22.0	9.0	3.8	1.2	1.8	0.4	6.1	1.3
Intra-euro area	44.9	68.8	63.9	54.7	52.9	47.1	52.9	63.3	65.1	68.4	53.3	56.4
Bulgaria	0.0	0.0	0.1	0.1	0.1	0.2	0.3	0.2	0.2	1.2	0.0	0.1
Czech Republic	0.7	2.4	0.0	0.5	1.3	1.7	2.1	2.9	4.1	2.6	0.7	0.7
Denmark	6.0	1.0	0.7	0.0	2.8	4.1	4.5	0.7	1.9	0.5	9.6	1.4
Estonia	3.6	0.0	0.1	0.4	0.0	7.9	2.4	0.1	0.1	0.0	1.0	0.2
Latvia	0.3	0.0	0.0	0.4	3.6	0.0	3.1	0.0	0.1	0.0	0.6	0.3
Lithuania	0.2	0.1	0.1	0.6	4.1	12.4	0.0	0.1	0.6	0.0	0.5	0.1
Hungary	0.8	1.8	2.3	0.4	1.1	1.1	1.2	0.0	2.1	4.6	0.6	0.5
Poland	1.1	2.1	4.8	2.1	3.2	6.3	8.3	3.2	0.0	2.8	2.2	0.7
Romania	0.0	3.8	0.3	0.1	0.1	0.0	0.1	1.5	0.4	0.0	0.1	0.3
Sweden	16.0	1.7	1.3	13.9	10.6	7.6	4.9	1.4	3.2	1.3	0.0	2.3
United Kingdom	6.9	3.8	3.6	8.2	2.9	2.7	4.6	3.3	4.5	4.5	8.8	0.0
Switzerland	1.3	1.8	1.9	1.2	1.0	2.1	1.1	1.6	1.5	1.2	1.5	2.2
Japan	3.5	1.8	2.7	1.2	4.4	0.2	2.5	4.7	2.2	1.6	2.4	4.4
United States	4.7	3.7	3.8	4.0	3.0	1.9	3.8	3.7	3.5	3.7	4.7	13.4
Norway	3.6	0.1	1.0	5.3	1.3	1.4	1.6	0.2	1.7	0.3	8.6	3.5
Canada	0.5	0.4	0.3	0.5	0.2	0.2	0.3	0.3	0.3	0.5	0.4	2.0
Australia, New Zealand	1.0	0.6	0.2	0.4	0.1	0.1	0.2	0.1	0.1	0.3	0.3	1.2
China	3.7	3.4	5.3	3.8	5.0	1.4	3.7	6.5	4.7	3.2	2.3	4.2
Hong-Kong	0.3	0.3	0.2	0.5	1.0	0.1	0.3	0.7	0.1	0.1	1.1	3.0
South Korea	0.4	0.9	0.8	1.2	0.9	0.4	1.3	1.9	1.3	1.5	0.8	1.5
Singapore	0.2	0.2	0.5	0.4	0.0	0.1	0.3	1.2	0.5	0.2	0.1	1.3
Extra-euro area	55.1	31.2	36.1	45.3	47.1	52.9	47.1	36.7	34.9	31.6	46.7	43.6
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: ECB staff calculations.

Table 4 Average export weights (%) used in CXD and EENX

(2003-2005)															
To country j	Exports from country k														
	BE	DE	IE	GR	ES	FR	IT	CY	LU	MT	NL	AT	PT	SI	SK
Belgium	0.0	6.5	4.1	5.0	5.8	8.7	6.1	2.7	21.2	3.0	9.2	4.5	4.8	3.9	4.2
Germany	18.3	0.0	13.0	16.6	19.6	20.0	20.1	11.4	20.9	10.0	18.7	31.4	16.6	20.8	25.9
Ireland	4.2	2.8	0.0	1.2	1.9	2.2	2.0	1.2	1.4	1.2	2.5	1.2	1.4	0.9	0.8
Greece	0.2	0.3	0.2	0.0	0.3	0.3	0.5	12.8	0.1	0.8	0.2	0.2	0.2	0.4	0.2
Spain	3.3	3.9	2.3	4.5	0.0	5.9	4.7	4.7	2.4	2.9	3.4	2.3	20.8	3.2	3.0
France	11.4	10.3	7.3	8.5	15.7	0.0	11.4	7.4	11.2	12.1	9.0	7.0	11.3	10.4	6.6
Italy	5.7	7.8	4.3	14.1	9.5	8.7	0.0	11.9	4.3	17.1	5.6	7.3	7.6	14.6	7.2
Cyprus	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Luxembourg	0.6	0.4	0.2	0.3	0.4	0.6	0.4	0.1	0.0	0.1	0.4	0.3	0.3	0.3	0.2
Malta	0.0	0.1	0.0	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Netherlands	13.1	8.7	6.8	7.2	7.1	8.6	7.7	3.9	7.3	4.2	0.0	6.7	6.6	5.3	5.4
Austria	1.7	3.5	1.2	1.6	1.8	2.0	3.1	1.0	1.7	1.1	2.1	0.0	1.4	7.9	5.5
Portugal	0.9	1.0	0.6	0.4	2.5	1.4	0.8	0.6	0.5	0.5	0.8	0.5	0.0	0.4	0.4
Slovenia	0.2	0.5	0.1	0.2	0.2	0.3	0.5	0.2	0.2	0.1	0.2	1.0	0.1	0.0	0.8
Slovakia	0.3	1.1	0.2	0.3	0.3	0.3	0.6	0.2	0.3	0.2	0.4	1.5	0.2	1.3	0.0
Finland	0.9	1.3	0.9	1.3	0.9	0.9	0.9	1.2	0.5	0.4	1.2	0.9	0.8	0.8	0.8
Intra-euro area	60.5	47.1	40.9	61.4	65.8	59.7	58.3	59.1	71.7	53.5	53.5	63.5	72.1	69.2	61.2
Bulgaria	0.2	0.2	0.1	1.2	0.2	0.1	0.3	0.5	0.1	0.2	0.1	0.2	0.1	0.3	0.1
Czech Republic	1.0	2.5	0.7	0.8	0.8	1.0	1.1	0.4	1.2	0.5	1.2	2.7	0.7	2.6	11.8
Denmark	1.1	1.8	1.5	1.3	1.2	1.3	1.2	1.1	0.9	0.9	1.6	1.1	1.0	1.0	1.0
Estonia	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Latvia	0.0	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.1
Lithuania	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1
Hungary	1.0	1.9	0.6	0.8	0.8	0.9	1.1	0.5	0.7	0.4	1.1	3.5	0.5	2.8	3.1
Poland	1.2	2.2	0.7	0.7	1.0	1.1	1.3	0.4	0.9	0.5	1.4	1.6	1.0	1.8	3.6
Romania	0.3	0.6	0.2	1.3	0.3	0.4	1.1	0.5	0.2	0.3	0.4	0.8	0.2	0.8	0.4
Sweden	2.3	2.4	1.7	1.8	1.8	1.8	1.9	2.0	1.2	0.9	2.5	1.7	1.7	1.5	1.5
United Kingdom	7.7	7.3	18.5	5.6	7.5	7.5	6.3	10.1	4.6	8.6	7.9	4.1	6.1	3.9	3.9
Switzerland	1.8	3.3	1.5	2.0	2.2	2.7	3.4	1.6	1.8	1.8	2.1	3.9	1.5	2.3	2.1
Japan	4.1	5.2	5.3	4.4	3.2	3.6	3.9	6.9	2.2	5.9	4.6	2.6	2.8	2.2	2.1
United States	7.3	8.6	11.1	5.9	5.3	7.5	6.5	6.9	5.0	8.9	9.1	4.8	4.3	3.8	3.1
Norway	1.7	2.3	1.8	0.6	1.3	1.8	1.3	0.6	0.9	0.9	2.1	0.8	1.7	0.7	0.7
Canada	1.8	2.6	4.5	0.9	1.1	1.9	2.3	0.5	0.8	2.5	1.5	1.2	1.2	0.9	0.7
Australia, New Zealand	0.6	0.7	0.8	0.4	0.5	0.6	0.8	0.5	0.2	0.9	0.6	0.3	0.3	0.3	0.2
China	3.7	5.2	4.4	4.1	3.7	3.9	4.7	5.2	5.0	4.6	5.4	2.8	2.0	2.5	2.3
Hong-Kong	1.3	1.9	2.0	0.6	0.9	1.2	1.4	1.1	1.1	1.7	1.4	1.1	0.7	0.7	0.7
South Korea	1.1	1.8	1.9	5.3	1.5	1.3	1.7	1.1	0.8	2.5	1.4	1.0	1.0	0.9	1.0
Singapore	0.8	1.1	1.5	0.4	0.5	0.9	0.7	0.6	0.4	4.1	1.3	0.6	0.4	0.4	0.3
Extra-euro area	39.5	52.9	59.1	38.6	34.2	40.3	41.7	40.9	28.3	46.5	46.5	36.5	27.9	30.8	38.8
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: ECB staff calculations.

Table 4 Average export weights (%) used in CXUD and EENX (cont'd)

(2003-2005)

To country <i>j</i>	Exports from country <i>k</i>											
	FI	BG	CZ	DK	EE	LV	LT	HU	PL	RO	SE	UK
Belgium	4.6	3.6	4.6	5.0	3.2	3.4	4.0	4.6	4.9	4.0	4.8	6.0
Germany	17.3	20.2	27.2	19.2	16.0	18.3	21.6	23.1	23.1	18.8	18.0	15.4
Ireland	1.7	1.0	1.2	1.7	1.0	1.1	1.2	1.1	1.2	1.1	2.0	3.4
Greece	0.2	5.4	0.2	0.2	0.2	0.2	0.4	0.3	0.3	1.4	0.2	0.3
Spain	2.3	3.4	2.7	2.4	1.5	1.9	2.2	2.7	3.3	3.1	2.3	3.6
France	6.7	9.2	7.3	7.0	4.6	4.8	6.5	7.4	8.6	9.3	6.9	8.7
Italy	5.0	12.3	6.9	5.3	4.6	5.2	6.2	7.9	8.5	16.4	4.7	5.6
Cyprus	0.0	0.1	0.0	0.0	0.0	0.0	0.4	0.0	0.1	0.0	0.0	0.1
Luxembourg	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.3	0.3	0.2	0.3	0.3
Malta	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1
Netherlands	6.8	5.1	6.0	7.7	5.0	5.4	5.5	6.2	6.7	5.0	7.4	7.4
Austria	1.8	3.1	4.7	1.9	1.6	1.9	1.9	6.0	3.0	3.9	1.6	1.5
Portugal	0.6	0.6	0.5	0.7	0.3	0.4	0.4	0.5	0.6	0.5	0.6	0.8
Slovenia	0.2	0.7	0.6	0.2	0.2	0.3	0.4	0.6	0.5	0.5	0.2	0.1
Slovakia	0.3	0.8	3.6	0.3	0.3	0.7	0.5	1.6	1.5	1.0	0.3	0.2
Finland	0.0	0.8	0.9	2.4	13.6	7.2	3.8	1.2	1.7	0.7	3.7	1.2
Intra-euro area	47.6	65.6	63.2	54.1	52.1	50.2	54.9	62.1	62.8	65.2	52.6	54.5
Bulgaria	0.1	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.8	0.1	0.1
Czech Republic	1.0	2.0	0.0	1.0	1.2	1.7	1.8	2.7	3.3	2.1	0.9	0.8
Denmark	4.2	1.1	1.2	0.0	3.6	3.8	3.6	1.3	2.1	0.9	5.8	1.5
Estonia	1.7	0.0	0.1	0.4	0.0	5.2	2.0	0.1	0.2	0.0	0.7	0.1
Latvia	0.3	0.0	0.1	0.3	2.2	0.0	1.8	0.0	0.2	0.0	0.4	0.2
Lithuania	0.4	0.1	0.1	0.4	3.1	8.0	0.0	0.1	0.4	0.1	0.4	0.1
Hungary	0.9	1.6	2.3	0.9	1.1	1.1	1.1	0.0	1.9	3.1	0.8	0.7
Poland	1.4	1.8	3.7	1.9	3.1	5.2	5.6	2.7	0.0	2.3	1.9	0.9
Romania	0.2	2.5	0.4	0.2	0.1	0.1	0.2	1.0	0.4	0.0	0.2	0.3
Sweden	8.7	1.8	1.7	8.4	9.1	6.4	4.7	1.7	3.0	1.6	0.0	2.3
United Kingdom	6.4	4.8	4.7	7.4	4.3	3.8	5.0	4.6	5.3	5.1	7.6	0.0
Switzerland	1.7	2.1	2.3	1.7	1.3	2.0	1.5	2.2	2.0	1.9	1.7	2.2
Japan	4.5	2.6	3.0	3.0	4.0	1.3	2.8	4.1	2.7	2.6	4.0	5.4
United States	6.2	4.5	4.6	5.9	4.0	3.5	4.9	4.7	4.6	4.6	6.2	11.6
Norway	2.9	0.6	1.2	3.8	2.1	1.9	1.9	0.9	1.8	0.8	5.0	2.7
Canada	2.2	1.2	0.8	1.6	0.7	0.8	1.0	0.9	0.8	1.1	2.6	3.9
Australia, New Zealand	0.9	0.6	0.3	0.6	0.3	0.3	0.3	0.3	0.2	0.4	0.7	1.1
China	4.3	3.4	4.2	4.3	4.4	2.1	3.5	4.9	4.0	3.4	3.7	5.0
Hong-Kong	1.9	0.8	0.8	1.4	1.2	0.7	0.8	1.1	0.8	0.9	2.1	2.8
South Korea	1.4	1.4	1.0	1.5	1.2	0.7	1.3	1.6	1.3	1.5	1.6	1.9
Singapore	0.8	0.4	0.7	0.8	0.4	0.3	0.5	1.0	0.6	0.5	0.8	1.5
Extra-euro area	52.4	34.4	36.8	45.9	47.9	49.8	45.1	37.9	37.2	34.8	47.4	45.5
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: ECB staff calculations.

4.2.4 EURO AREA TRADE SHARES

By combining the individual countries comprising the euro area into a single euro area entity, excluding intra-area trade flows, we obtain a matrix of export shares for the consolidated euro area and its trading partners. This matrix is presented in Table 5 below. These weights are used in the computation of euro area export demand (*WDR*), competitors' prices (*CXD* and *CMD*) and nominal effective exchange rates

(*EENX* and *EENM*) (see equations 2.5, 2.10, 2.14, 2.18, and 2.21 in Section 2 above).

4.2.5 DEVELOPMENTS IN TRADE SHARES

Clearly, the geographical composition of countries' exports has changed significantly since the beginning of the 1980s. The most striking development has been the growing share of the countries that joined the EU in 2004 and 2007, the so-called new Member States

Table 5 Average euro area trade weights¹⁾

(percentages; 2003-2005)

	Export Side		Import Side
	WDR	CXD, EENX	CMD, EENM
Bulgaria	0.4	0.3	0.5
Czech Republic	2.7	3.2	3.7
Denmark	2.4	3.5	3.2
Estonia	0.3	0.3	0.3
Latvia	0.2	0.4	0.1
Lithuania	0.3	0.2	0.3
Hungary	2.3	2.7	3.5
Poland	3.3	3.2	3.7
Romania	1.1	1.0	1.4
Sweden	3.7	5.2	5.2
United Kingdom	19.1	13.8	20.4
Switzerland	6.3	4.9	7.3
Japan	3.1	10.0	8.2
United States	16.8	17.7	18.1
Norway	1.2	4.5	4.2
Canada	1.4	5.9	1.5
Australia, New Zealand	1.4	1.7	1.1
CIS countries	3.9	-	-
Latin America	4.6	-	-
Asia, non-Japan	11.3	-	-
Rest of world	13.3	-	-
China	-	10.5	10.7
Hong-Kong	-	3.7	0.9
South Korea	-	3.6	2.7
Singapore	-	2.2	1.6
	100.0	100.0	100.0

Source: ECB staff calculations.

1) Cyprus and Malta are included in the euro area.

(NMSs). The share of exports going to NMSs varies a great deal across countries.

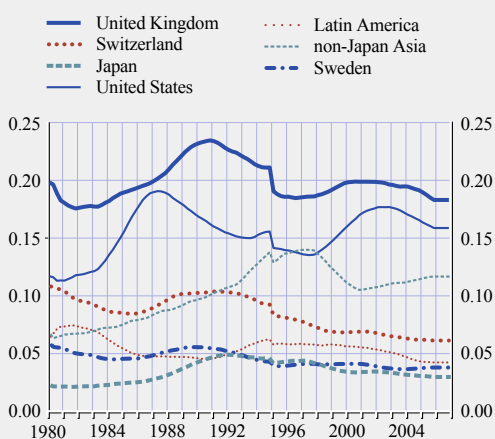
Due to space limitations we will only give a couple of examples of developments in trade shares over time. In Chart 22 we show the developments in euro area export shares to the United Kingdom, Switzerland, Japan, United States, Latin America, non-Japan Asia, and Sweden between 1980 and 2006. Although the changes in trade shares are rather gradual, over time the shifts can be quite sizeable. We see that the share of euro area exports going to Sweden, Switzerland, and Latin America, has decreased over time, while the share of exports to non-Japan Asia has grown.

In Chart 23 we show the developments in the German shares of exports to euro area countries. We notice that its share of all intra-euro area export markets, except Spain, has declined over time. This is a result of the ongoing integration of new markets into the global economy. The division between intra and extra-euro area export shares is illustrated in Chart 25.

In Chart 24 we show the developments in the German shares of exports to the same non-euro

Chart 22 The euro area's share of selected export markets over the period 1980-2006¹⁾

(percentages)

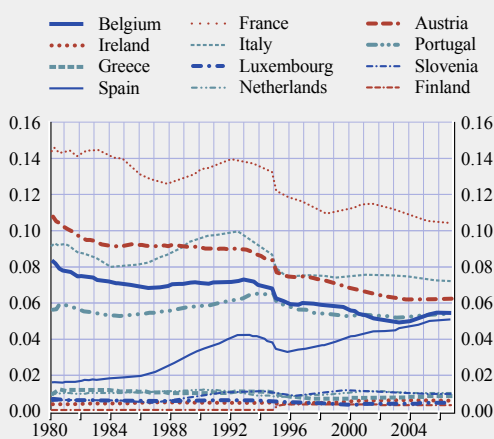


Source: ECB staff calculations.

1) The discrete jump in Q1 1995 is due to the introduction of the new Member States, whose pre-1995 weights are set to zero.

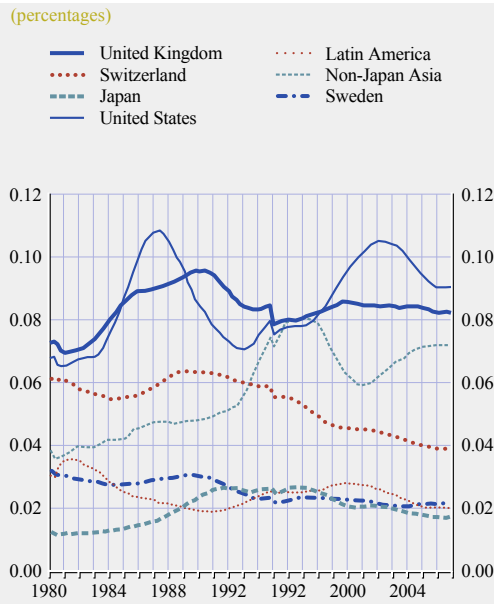
Chart 23 Germany's share of selected intra-euro area export markets between 1980 and 2006

(percentages)



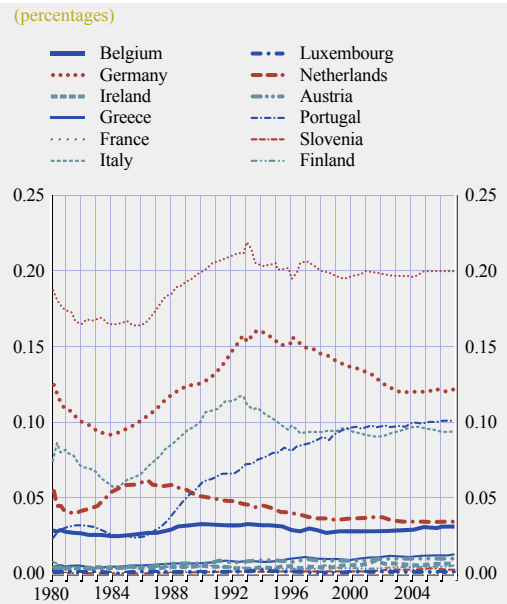
Source: ECB staff calculations.

Chart 24 Germany's extra-euro area export market shares over the period 1980-2006



Source: ECB staff calculations.

Chart 26 Spain's shares of selected intra-euro area export markets over the period 1980-2006

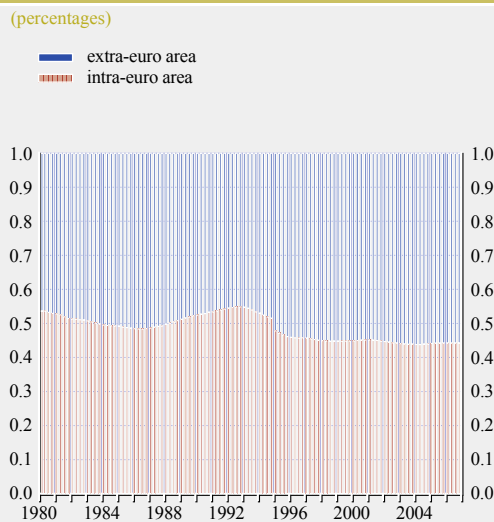


Source: ECB staff calculations.

area destinations as for the euro area in the previous chart. The developments are similar to those for the euro area.

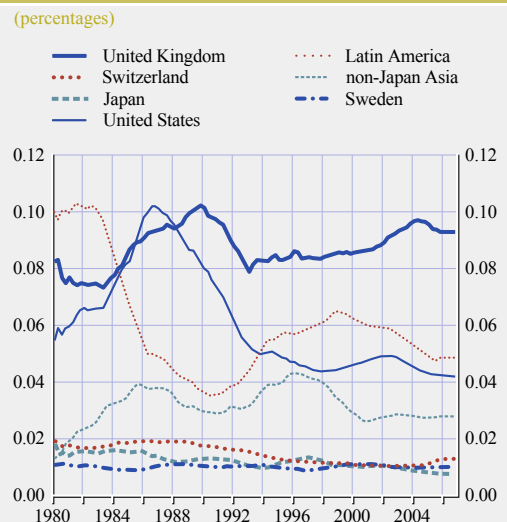
In Charts 26-28 we show the same variables for Spain, which shows somewhat different developments in export markets, as compared

Chart 25 Germany's intra and extra-euro area export market shares between 1980 and 2006



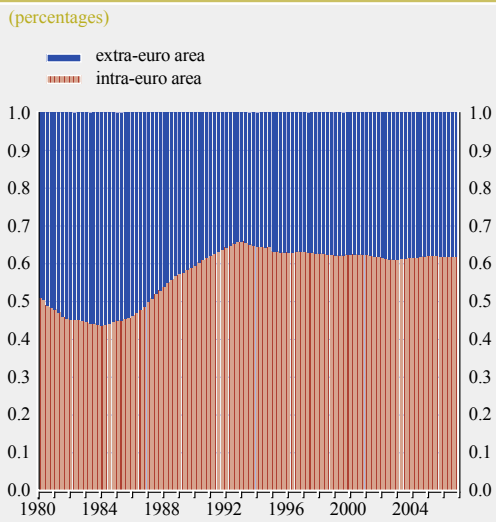
Source: ECB staff calculations.

Chart 27 Spain's shares of extra-euro area export markets over the period 1980-2006



Source: ECB staff calculations.

Chart 28 Spain's shares of intra and extra-euro area export markets over the period 1980-2006



Source: ECB staff calculations.

to Germany. As can be seen, the developments in intra-euro area trade show an increase over time, especially after Spain joined the EU in the mid 1980s.

5 TCE IN THE PROJECTION EXERCISE: AN EXAMPLE

The objective of this section is to illustrate how the concepts defined in Section 2 and 3 are applied in the actual projection rounds.¹²

5.1 EX ANTE/EX POST TRADE CONSISTENCY

Ex ante/ex post trade consistency consists of two parts. First, different iterations of export demand are compared. Second, different iterations of competitors' prices are compared. Here iterations refer to the successive updates of the forecast numbers undertaken within a forecast round.

5.1.1 EXPORT DEMAND INDICATOR

Table 6 shows a comparison of three iterations of the export demand indicator. For each year, we report under the column heading "*WDR_1*" the annual growth rate of the *initial set of export demand indicators*, based on an initial set of external assumptions and an initial set of country forecasts. The column "*WDR_2*" contains a second set of annual growth rates for export demand, based on a first set of *model forecasts*. The column "*WDR_3*" contains the figures corresponding to a revised set of external

assumptions and the corresponding model forecasts. Finally, the column labelled "Diff" shows the difference between the "*WDR_3*" and "*WDR_2*".

As can be seen in Table 6, the differences between the initial set of assumptions of export demand (*WDR_1*) and what is *implied* by the corresponding model forecasts, shown in the second set of columns as *WDR_2*, are relatively large. This implies that *WDR_2* will now replace *WDR_1* as part of the external assumptions. A new model simulation (projection) will be performed and the export demand resulting from this new projection is denoted *WDR_3*. As we can see from the table, the discrepancies are quite small between iteration "3" and "2", amounting at most to 0.1 percentage points in absolute terms. This is usually small enough not to warrant another iteration of the model simulation. Thus, the export demand assumption for the new iteration (*WDR_2*) is very close to what you get by computing the export demand indicator using the results from this last model simulation (projection), i.e. *WDR_3*. The export demand implied by the latest model iteration is

¹² The numbers in the illustrations are purely for illustrative purposes and do not belong to any specific actual projection round.

Table 6 Ex ante/ex post trade consistency – Export demand assumptions (WDR)¹⁾

(annual percentage growth rates)

	2007				2008				2009			
	WDR_1	WDR_2	WDR_3	Diff	WDR_1	WDR_2	WDR_3	Diff	WDR_1	WDR_2	WDR_3	Diff
Belgium	5.6	5.0	5.1	0.1	6.5	6.0	5.9	-0.1	6.5	6.1	6.0	-0.1
Germany	6.2	5.7	5.7	0.0	6.5	6.2	6.1	-0.1	6.7	6.3	6.2	-0.1
Ireland	4.2	3.8	3.8	0.0	5.8	5.5	5.5	0.0	6.0	5.7	5.6	-0.1
Greece	6.5	6.1	6.1	0.0	6.6	6.3	6.2	-0.1	6.5	6.2	6.2	0.0
Spain	5.5	4.9	4.9	0.0	6.0	5.6	5.5	-0.1	6.4	5.9	5.8	-0.1
France	5.8	5.5	5.4	-0.1	6.2	5.9	5.8	-0.1	6.4	6.0	5.9	-0.1
Italy	6.5	6.2	6.2	0.0	6.9	6.6	6.5	-0.1	6.9	6.6	6.5	-0.1
Cyprus	5.0	4.8	4.8	0.0	7.1	6.7	6.7	0.0	6.7	6.4	6.4	0.0
Luxembourg	5.3	4.9	5.0	0.1	6.2	5.8	5.7	-0.1	6.2	5.8	5.7	-0.1
Malta	5.5	5.2	5.1	-0.1	7.0	6.7	6.6	-0.1	7.3	7.0	7.0	0.0
Netherlands	5.6	5.2	5.3	0.1	6.5	6.0	6.0	0.0	6.4	6.0	5.9	-0.1
Austria	6.6	6.2	6.3	0.1	6.7	6.3	6.3	0.0	6.8	6.5	6.4	-0.1
Portugal	5.5	5.1	5.2	0.1	6.2	5.8	5.7	-0.1	6.0	5.7	5.6	-0.1
Slovenia	6.6	6.1	6.2	0.1	6.5	6.2	6.2	0.0	6.5	6.2	6.2	0.0
Finland	7.2	6.9	6.9	0.0	7.0	6.8	6.7	-0.1	6.9	6.6	6.5	-0.1
EA15	5.8	5.6	5.6	0.0	6.5	6.1	6.0	-0.1	6.5	6.2	6.1	-0.1

Source: ECB staff calculations.

1) EA15 denotes an unweighted average of the individual country growth rates.

Table 7 Ex ante/ex post trade consistency – Assumptions for competitors' prices on the export side (CXD)

(annual percentage growth rates)

	2007				2008				2009			
	CXD_1	CXD_2	CXD_3	Diff	CXD_1	CXD_2	CXD_3	Diff	CXD_1	CXD_2	CXD_3	Diff
Belgium	0.7	0.5	0.4	-0.1	1.6	1.0	1.0	0.0	1.7	1.3	1.3	0.0
Germany	0.4	0.5	0.5	0.0	1.6	1.0	1.0	0.0	1.7	1.4	1.4	0.0
Ireland	0.2	0.0	0.0	0.0	1.5	0.7	0.7	0.0	1.7	1.3	1.3	0.0
Greece	1.0	0.8	0.8	0.0	1.6	0.9	0.9	0.0	1.8	1.5	1.5	0.0
Spain	1.1	0.9	0.8	-0.1	1.7	1.1	1.1	0.0	1.7	1.4	1.4	0.0
France	1.0	0.8	0.7	-0.1	1.7	1.1	1.1	0.0	1.7	1.5	1.5	0.0
Italy	0.6	0.3	0.2	-0.1	1.7	1.0	1.0	0.0	1.7	1.4	1.4	0.0
Cyprus	2.1	2.1	2.1	0.0	2.0	1.5	1.5	0.0	1.9	1.5	1.5	0.0
Luxembourg	1.0	1.0	0.9	-0.1	1.8	1.2	1.2	0.0	1.8	1.5	1.5	0.0
Malta	0.9	0.8	0.8	0.0	1.6	0.9	0.8	-0.1	1.8	1.5	1.5	0.0
Netherlands	0.5	0.4	0.3	-0.1	1.6	1.0	0.9	-0.1	1.7	1.4	1.4	0.0
Austria	1.2	0.7	0.6	-0.1	1.7	1.1	1.0	-0.1	1.7	1.4	1.4	0.0
Portugal	1.3	1.2	1.1	-0.1	1.8	1.3	1.3	0.0	1.7	1.4	1.5	0.1
Slovenia	1.7	1.4	1.3	-0.1	1.8	1.3	1.2	-0.1	1.8	1.5	1.5	0.0
Finland	0.5	0.3	0.3	-0.1	1.6	1.1	1.0	-0.1	1.7	1.3	1.3	0.0
EA15	0.7	0.6	0.5	-0.1	1.7	1.1	1.0	-0.1	1.7	1.4	1.4	0.0

Source: ECB staff calculations.

consistent with the export demand assumption of that iteration, or in other words we have achieved *ex ante/ex post* consistency with respect to the export demand indicator.

5.1.2 COMPETITORS' PRICES ON THE EXPORT AND IMPORT SIDES

Just as for export demand, the same check for *ex ante/ex post* trade consistency is carried out with respect to competitors'

prices on both the export and the import side. In Table 7 we present the different iterations of competitors' prices on the export side, whereas Table 8 considers competitors' prices on the import side.

As can be seen in Tables 7 and 8, whereas the differences between the first two iterations are sizeable, the discrepancies between the last two iterations are negligible.

Table 8 Ex ante/ex post trade consistency – Assumptions for competitors' prices on the import side (CMD)

(annual percentage growth rates)

	2007				2008				2009			
	CMD_1	CMD_2	CMD_3	Diff	CMD_1	CMD_2	CMD_3	Diff	CMD_1	CMD_2	CMD_3	Diff
Belgium	1.0	0.6	0.5	-0.1	1.3	1.0	1.0	0.0	1.7	1.4	1.4	0.0
Germany	0.8	0.7	0.6	-0.1	1.3	1.0	1.1	0.1	1.7	1.4	1.4	0.0
Ireland	0.4	-0.2	-0.2	0.0	1.1	0.0	-0.1	-0.1	1.7	1.3	1.3	0.0
Greece	1.2	0.9	0.9	0.0	1.3	0.9	0.8	-0.1	1.8	1.5	1.5	0.0
Spain	1.3	1.1	1.1	0.0	1.4	1.2	1.1	-0.1	1.7	1.4	1.4	0.0
France	1.4	1.2	1.2	0.0	1.5	1.2	1.2	0.0	1.9	1.5	1.5	0.0
Italy	1.0	0.6	0.5	-0.1	1.5	1.1	1.0	-0.1	1.7	1.4	1.4	0.0
Cyprus	1.9	2.2	2.2	0.0	1.9	1.5	1.5	0.0	1.9	1.6	1.6	0.0
Luxembourg	1.2	1.2	1.1	-0.1	1.6	1.3	1.3	0.0	1.9	1.6	1.6	0.0
Malta	1.7	1.5	1.5	0.0	1.3	0.9	0.8	-0.1	1.8	1.5	1.5	0.0
Netherlands	0.5	0.2	0.1	-0.1	1.3	0.9	0.8	-0.1	1.7	1.3	1.3	0.0
Austria	1.3	0.8	0.7	-0.1	1.4	1.2	1.1	-0.1	1.7	1.4	1.4	0.0
Portugal	1.7	1.5	1.4	-0.2	1.7	1.5	1.4	-0.1	1.7	1.4	1.6	0.2
Slovenia	2.2	1.9	1.8	-0.1	1.5	1.4	1.3	-0.1	1.8	1.6	1.5	0.0
Finland	0.9	0.6	0.5	-0.1	1.3	1.1	1.1	0.0	1.6	1.3	1.2	0.0
EA15	1.0	0.8	0.8	0.0	1.4	1.1	1.1	0.0	1.7	1.4	1.4	0.0

Source: ECB staff calculations.

5.2 CROSS-TRADE CONSISTENCY

The second part of the trade consistency exercise is cross-trade consistency, which has a direct economic application. First, in Section 5.2.1., we analyse cross-country developments in export market shares. Thereafter, in Section 5.2.2., we try to associate changes in market shares with changes in export competitiveness. Lastly, in Section 5.2.3., we decompose import price projections into various sub-components.

5.2.1 EXPORT MARKET SHARES

The discrepancy between the growth rate of projected exports (*XTR*) and export demand (*WDR*) is an indication of the expected change in export market shares. A comparison, over the projection horizon, of exports and export demand is presented in Table 9.

There are three different columns for each year. The first column (*XTR*) shows the projected growth rates for real exports, the second (*WDR*) shows the annual growth rate of export demand and the third (*XSHAR*) is the difference between export growth and world market growth, i.e. the change in export market shares. A positive number thus indicates that projected exports grew faster than export demand, implying a

gain in export market shares. The last row (EA15), gives an unweighted average of the country growth rates.

As can be seen in Table 9, the euro area (last row) is, in this particular case, projected to suffer a cumulative loss of almost 2% of its market shares over the three-year projection horizon. Among the individual countries we notice very strong gains in market shares for Slovenia, whereas the opposite is true for Italy and Cyprus.

Generally, the changes in market share (in absolute terms) tend to diminish over the forecast horizon. In the near term, projections reflect the country-specific circumstances that happen to prevail at the moment. However, in 2-3 years time it is normally assumed that growth will be more or less in line with potential output and that there are no major asymmetric shocks to competitiveness. This makes trade growth forecasts more alike across countries and hence tends to stabilise market shares towards the end of the forecast horizon.

It is important to note that we can only interpret the gain or loss of market shares relative to the past if the historical market share has

Table 9 Real exports and export demand

(annual percentage growth rates)

	2007			2008			2009		
	XTR	WDR	XSHAR	XTR	WDR	XSHAR	XTR	WDR	XSHAR
Belgium	5.0	5.1	-0.1	4.7	5.7	-1.0	4.9	5.9	-1.0
Germany	8.0	5.7	2.3	6.6	6.0	0.6	6.2	6.2	0.0
Ireland	6.5	3.8	2.7	5.3	5.3	0.0	5.4	5.7	-0.3
Greece	8.5	6.1	2.4	6.4	6.2	0.2	5.9	6.2	-0.3
Spain	4.4	4.9	-0.5	4.6	5.5	-0.9	5.4	5.8	-0.4
France	3.2	5.5	-2.3	5.5	5.8	-0.3	6.4	6.0	0.4
Italy	2.0	6.2	-4.2	2.4	6.5	-4.1	3.9	6.5	-2.6
Cyprus	2.7	4.8	-2.1	2.8	6.7	-3.9	3.5	6.4	-2.9
Luxembourg	6.3	5.0	1.3	4.6	5.6	-1.0	4.4	5.7	-1.3
Malta	6.8	5.2	1.6	6.8	6.6	0.2	6.6	7.0	-0.4
Netherlands	5.4	5.3	0.1	4.0	6.0	-2.0	5.3	5.9	-0.6
Austria	7.1	6.4	0.7	6.6	6.3	0.3	6.8	6.4	0.4
Portugal	6.0	5.2	0.8	5.8	5.5	0.3	6.5	5.6	0.9
Slovenia	10.6	6.3	4.3	9.0	6.2	2.8	8.6	6.1	2.5
Finland	9.0	6.9	2.1	6.3	6.7	-0.3	4.9	6.6	-1.7
EA15	5.2	5.6	-0.4	5.1	6.0	-0.9	5.6	6.1	-0.5

Source: ECB staff calculations.

been relatively constant. If there has been a pronounced trend in a country's market share over time, our measure can be misleading. Since the projection only covers three years, it might be useful to have a longer perspective as a benchmark. In Chart 29 we compare, for each euro area country, the average annual growth rates of export market shares over the period 1999-2006 with the annual average over the projection horizon 2007-2009. This comparison shows, for example, that the large projected gains in market shares for Slovenia are actually in line with previous outcomes and similar to the market losses of Italy.

Changes in market share should be reflected in corresponding shifts in export competitiveness. Hence it is necessary to check and compare the projections of export market shares with our forecasts of relative prices (real exchange rates). When large changes in market shares cannot be explained in this way, and we are unable to identify the source of the discrepancy, we may consider that it is necessary to revise the

projections. This leads us to the next part of cross-trade consistency, the analysis of export competitiveness.

5.2.2 EXPORT COMPETITIVENESS

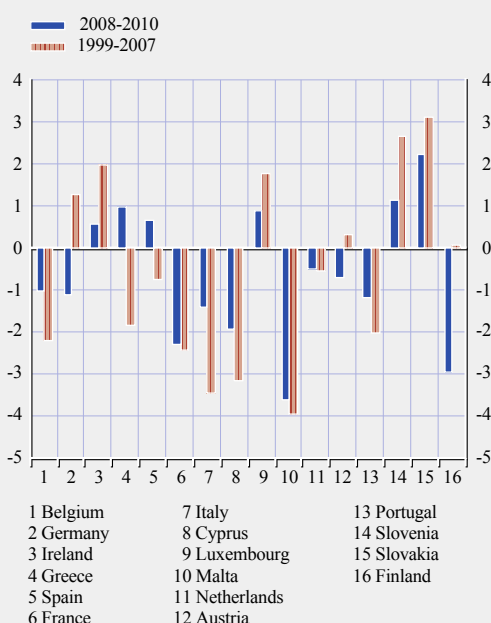
The discrepancy between the growth rate of projected export prices (*XTD*) and competitors' export prices (*CXD*) is an indication of the expected change in export competitiveness. A comparison, over the projection horizon, of exports and export demand is presented in Table 10. For each year, three different columns are presented. The first column (*CXD*) shows the projected rates of growth of competitors' export prices, the second (*XTD*) gives the annual growth rate of export prices and the third (*XCOMP*) show the difference between the rate of growth of competitors' export prices and export prices, i.e. the change in export competitiveness. A positive number thus indicates that projected competitors' export prices grow faster than export prices, implying a gain in export competitiveness. The last row (EA15), gives an unweighted average of the country growth rates.

As can be seen in Table 10, the euro area (last row) is expected to suffer a cumulative loss of export competitiveness of almost 2% over the three years. In Chart 30 we compare, for each euro area country, the average annual growth rates of export competitiveness over the period 1999-2006 with the annual average over the projection horizon 2007-2009. It is noteworthy that only Germany, France and Finland are projected to gain competitiveness over the entire projection horizon, a development that is in line with the change in their export competitiveness between 1999 and 2006.

Ceteris paribus, we would expect there to be a positive relationship between the change in export markets (*XSHAR*), shown in Chart 29, and export competitiveness (*XCOMP*), shown in Chart 30. This is indeed the case for a number of countries, specifically Belgium, Germany, Greece, Italy, Malta and Cyprus. Two countries have increased market shares, despite a loss in competitiveness, namely Luxembourg and

Chart 29 Export market shares over the period 1999-2010

(annual percentage growth rates)



Source: ECB staff calculations.

Table 10 Export prices and competitors' prices on the export side

(annual percentage growth rates)

	2007			2008			2009		
	CXD	XTD	XCOMP	CXD	XTD	XCOMP	CXD	XTD	XCOMP
Belgium	0.4	2.8	-2.4	1.0	2.7	-1.7	1.3	2.0	-0.6
Germany	0.5	0.2	0.3	1.0	1.0	0.0	1.4	1.2	0.2
Ireland	-0.1	1.7	-1.8	0.7	2.4	-1.7	1.3	2.4	-1.0
Greece	0.8	1.1	-0.3	0.9	2.0	-1.1	1.5	2.0	-0.5
Spain	0.8	1.9	-1.1	1.1	1.8	-0.7	1.4	2.1	-0.7
France	0.7	0.7	0.0	1.1	1.5	-0.4	1.5	0.8	0.7
Italy	0.2	6.3	-6.1	1.0	2.0	-1.0	1.4	2.1	-0.7
Cyprus	2.1	1.5	0.6	1.5	1.7	-0.2	1.5	2.2	-0.6
Luxembourg	0.9	2.5	-1.6	1.2	2.5	-1.3	1.5	2.8	-1.3
Malta	0.8	3.2	-2.4	0.8	2.4	-1.6	1.5	2.5	-1.1
Netherlands	0.3	1.5	-1.2	0.9	1.4	-0.5	1.4	1.4	0.0
Austria	0.6	1.5	-0.9	1.0	1.6	-0.6	1.4	1.7	-0.3
Portugal	1.0	3.0	-2.0	1.3	1.9	-0.6	1.5	2.0	-0.5
Slovenia	1.3	2.5	-1.2	1.2	3.2	-2.0	1.5	2.8	-1.4
Finland	0.3	1.2	-0.9	1.0	0.6	0.4	1.3	0.1	1.2
EA15	0.5	2.0	-1.5	1.0	1.6	-0.6	1.4	1.5	-0.1

Source: ECB staff calculations.

Slovenia.¹³ One has to remember that our measure of competitiveness is a very crude measure and ignores many important aspects of competitiveness, as well as the composition of exports. The purpose of the trade consistency analysis is not to provide a detailed analysis

of trade, but rather to point out obvious inconsistencies that may require further study and explanation in the context of the country projections.

5.2.3 DECOMPOSITION OF IMPORT PRICES

In this section we present a simple decomposition of the import deflator projection, measured in domestic currency (*MTD*). Import prices are, in the long run, modelled as a weighted average of the GDP deflator (*YED*), competitors' prices on the import side, divided into intra and extra-euro area components (*CMD*^{intra} and *CMD*^{extra}), and energy prices (*PEI*), all measured in domestic currency:¹⁴

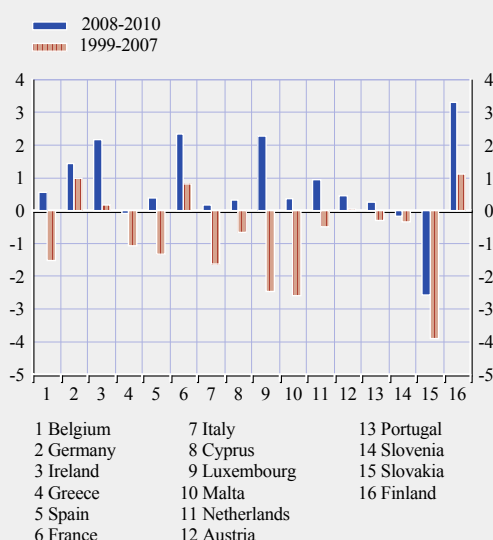
$$\begin{aligned}
 MTDLR_k(t) = & \alpha \cdot YED_k(t) + \\
 & \beta \cdot [\gamma \cdot CMD_k^{intra} + (1-\gamma) \cdot CMD_k^{extra}] + \\
 & (1-\alpha-\beta) \cdot PEI_k
 \end{aligned}
 \tag{5.1}$$

13 See Appendix A for the correlation between export competitiveness and export market shares for all euro area countries.

14 Note that since *CMD* is a weighted average of trading partners' export prices, it contains the effects of oil prices to the extent that these are reflected in a country's export prices. Oil exporting countries in Latin America, Asia and the CIS countries are thus taken into account. The combined weight of these regions is approximately 10%, depending on the exact weighting scheme used. However, the Middle East region is not included among the trading partners.

Chart 30 Export competitiveness over the period 1999-2010

(annual percentage growth rates)



Source: ECB staff calculations.

Table 11 Decomposition of import prices

(annual percentage growth rates)									
	CMD	CMDIN	CMDEX	2007-2009				MTD	Diff
				YED	PEI	MTDLR			
Belgium	1.0	1.4	0.1	2.3	3.0	1.2	1.6	0.5	
Germany	1.0	1.9	0.3	1.6	3.0	1.2	0.9	-0.3	
Ireland	0.4	1.4	0.0	2.5	3.0	0.6	2.7	2.0	
Greece	1.1	1.9	-0.3	3.3	3.0	1.3	0.9	-0.4	
Spain	1.2	1.6	0.2	2.6	3.0	1.4	1.6	0.2	
France	1.3	1.8	0.2	2.1	3.0	1.5	0.6	-0.8	
Italy	1.0	1.3	0.4	2.5	3.0	1.2	2.5	1.3	
Cyprus	1.7	2.4	0.6	2.1	3.0	1.9	2.1	0.2	
Luxembourg	1.3	1.7	0.3	2.6	3.0	1.5	1.0	-0.5	
Malta	1.3	2.2	-0.5	1.8	3.0	1.4	2.2	0.8	
Netherlands	0.8	1.5	-0.1	2.1	3.0	1.0	1.1	0.1	
Austria	1.0	1.2	0.5	2.2	3.0	1.2	1.4	0.2	
Portugal	1.4	1.7	0.3	2.6	3.0	1.6	1.3	-0.3	
Slovenia	1.5	1.8	0.6	3.2	3.0	1.7	2.8	1.1	
Finland	1.0	1.4	0.6	1.1	3.0	1.2	3.2	2.0	
EA15	1.1	1.6	0.2	2.2	3.0	1.3	1.4	0.1	

Source: ECB staff calculations.

In order to have a simple benchmark, we assume that the weights α and β are the same for all countries. We set equal α to 0.10 and β equal to 0.90. In Table 11, we show the average annual growth rates over the period 2007-09 for projected import prices (MTD), long-run import prices (MTDLR), as computed in equation (5.1), and the difference between the two (Diff).

For all countries, the average projected increase in domestic import prices (MTD) over the forecast horizon is somewhat (0.1 percentage points) above the corresponding long-run response of import prices (MTDLR), given the developments in oil and commodity prices, the exchange rate and competitors' prices. However, there are large differences between countries, with Ireland, Italy, Slovenia, Finland and Malta showing projected import prices that are higher than long-run prices, whereas the opposite is true for France and Luxembourg.

6 CONCLUSIONS

This paper provides a comprehensive review of the data and techniques underlying the *trade consistency exercises* (TCE) performed during the regular projection exercises, the BMPEs and MPEs, conducted by the Eurosystem and ECB.

Were the projection exercises carried out using a large multi-country model incorporating all relevant countries simultaneously there would be no need for a trade consistency exercise. If properly specified, the model would ensure that all trade flows and prices were mutually consistent at any point in time (*cross-trade consistency*) and also between different iterations (*ex ante/ex post consistency*).

Obviously, this is not how projections are obtained in reality. In the BMPE, each national central bank prepares a projection for its own country, while during the MPE, the ECB prepares a projection for each of the euro area members and an aggregate euro area projection. This decentralised approach makes it necessary to introduce procedures to investigate whether the individual country forecasts are mutually compatible with regard to foreign trade. For example an increase in the projected exports of one country must necessarily be reflected in higher imports in other countries.

It is the purpose of the *TCE* to ensure that individual country projections are consistent with each other regarding the assumptions made about the international environment. Trade consistency is analysed in two parts: first, the *cross-trade consistency* part examines the consistency of the trade projections at any given point in time; and second, the *ex ante/ex post trade consistency* part compares projections of a given variable across different projection iterations.

We started by describing in some detail the different TCE variables (export demand, competitors' prices and nominal effective exchange rates), as well as presenting their developments over the recent past. Next, we

introduced the concepts of export market share, which is defined as the ratio between projected exports and export demand, and export competitiveness, defined as the ratio between projected competitors' prices on the export side and projected export prices.

Having discussed the different concepts used in the TCE, we described the actual data used in the computation of the TCE variables and their geographical coverage. We also presented the export and import shares used, including weights incorporating third-market effects.

Lastly, having surveyed both the theoretical concepts and the underlying data, we provided a fictional example of the TCE analysis in the projection setting, using the standard set of tables and some additional material illustrating the actual developments in export market shares and export competitiveness in the recent past.

It is important to note that the TCE is only meant to give an overview of the trade projections of the different countries and identify patterns that might be inconsistent or require further investigation. Thus, the TCE should be seen as an important complement to country and area-wide projections and not as a substitute for a detailed country analysis. In short, the TCE may give rise to changes in the underlying trade projections for individual countries in the course of the different iterations in the projection exercises of the Eurosystem and the ECB.

APPENDIX

In this appendix we report on the correlation between export market shares and export competitiveness (see equations (3.1) and (3.7) above), at the country level.

The Chart shows the average annual growth rates of export market shares (*XSHAR*) and export competitiveness (*XCOMP*) across euro area countries during the period 1999-2007. Keeping other factors constant, we would expect there to be a positive relationship between changes in export market shares and changes in export competitiveness. Apart from Luxembourg and Slovakia, the chart shows a rather strong positive correlation (0.59), which supports the theory that export shares are, at least partly, determined by competitiveness. The fact that Luxembourg and Slovakia are outliers in this respect can be explained by the dominant position of financial services for Luxembourg and the late entry of Slovakia into the euro area. This illustrates the point made earlier that country-specific

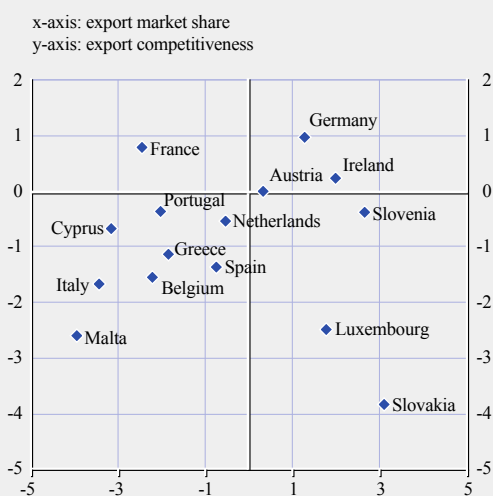
non-competitiveness factors are also potentially important determinants of the development of export market shares.

In the Table, we report three different measures of the correlation between export market shares and competitiveness over the period 1999-2007, for each euro area country.

In column one, we show correlations using the *levels* of market shares and competitiveness. We see that most of these correlations are positive. In the second column we show the correlation between the quarterly percentage changes in export markets and competitiveness. In this case we only have a few positive correlations. Since quarterly changes are quite volatile, this measure might not be very useful. In the last column, we relate annual percentage changes in export markets and competitiveness. Most correlations are positive, but we still have a number of negative correlations, indicating that exports are not only determined by relative prices.

Export market shares and export competitiveness across euro area countries

(annual percentage changes over the period 1999-2007)



Source:

Correlation between export market shares and export competitiveness

(1999-2007)

	Quarterly levels (1)	Quarterly percentage changes (2)	Annual percentage changes (3)
Belgium	0.92	-0.33	-0.50
Germany	0.33	-0.13	0.10
Ireland	-0.50	-0.17	-0.04
Greece	0.81	-0.06	-0.07
Spain	0.66	-0.16	-0.16
France	0.13	0.02	0.53
Italy	0.96	-0.06	0.34
Cyprus	0.88	-0.24	0.00
Luxembourg	-0.81	-0.10	-0.17
Malta	0.60	-0.14	-0.30
Netherlands	0.81	-0.13	0.68
Austria	0.05	-0.22	0.14
Portugal	0.59	-0.16	-0.54
Slovenia	-0.75	-0.14	-0.45
Slovakia	-0.78	0.26	0.44
Finland	0.16	0.15	0.87
Euro area	0.70	0.05	0.44

Source: ECB staff calculations.

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