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Competitiveness and Specialisation of the Austrian Export Sector - A Constant-Market-Shares Analysis

Edith Skriner

Abstract

This constant-market-shares (CMS) analysis shows the development of competitiveness, market and product structure of the Austrian merchandise exports from 1990 to 2006. The traditional CMS application was transformed to a dynamic model, such that the static indicators have been replaced by time series. This dynamic consideration of the CMS analysis helps to track all changes in the trade structure and competitiveness over time. The long-term trend of the indicators suggests that the Austrian foreign trade sector was able to maintain its market share in the global environment. While the Austrian foreign trade performance only slightly deviates from the pattern of the traditional industrialised countries, a strong structural change is observable in the external sector of the emerging markets. The disadvantages in competitiveness of the Austrian foreign sector have vanished, however, the market and product structure effects show negative trends after 2000, pointing to vulnerability in the Austrian export sector.

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The author/s

Edith Skriner works as an economist at the Vienna Institute of Advanced Studies.
E-Mail: edith.skriner@ihs.ac.at

Contact:

Edith Skriner
Department of Economics and Finance
Institute for Advanced Studies
Stumpergasse 56
1060 Vienna, Austria
☎: +43/1/599 91-228
email: skriner@ihs.ac.at

Founded in 1963 by two prominent Austrians living in exile – the sociologist Paul F. Lazarsfeld and the economist Oskar Morgenstern – with the financial support from the Ford Foundation, the Austrian Federal Ministry of Education and the City of Vienna, the Institute for Advanced Studies (IHS) is the first institution for postgraduate education and research in economics and the social sciences in Austria. The **Economics Series** presents research done at the Department of Economics and Finance and aims to share "work in progress" in a timely way before formal publication. As usual, authors bear full responsibility for the content of their contributions.

Das Institut für Höhere Studien (IHS) wurde im Jahr 1963 von zwei prominenten Exilösterreichern – dem Soziologen Paul F. Lazarsfeld und dem Ökonomen Oskar Morgenstern – mit Hilfe der Ford-Stiftung, des Österreichischen Bundesministeriums für Unterricht und der Stadt Wien gegründet und ist somit die erste nachuniversitäre Lehr- und Forschungsstätte für die Sozial- und Wirtschafts-wissenschaften in Österreich. Die **Reihe Ökonomie** bietet Einblick in die Forschungsarbeit der Abteilung für Ökonomie und Finanzwirtschaft und verfolgt das Ziel, abteilungsinterne Diskussionsbeiträge einer breiteren fachinternen Öffentlichkeit zugänglich zu machen. Die inhaltliche Verantwortung für die veröffentlichten Beiträge liegt bei den Autoren und Autorinnen.

Contents

1 Introduction

This analysis provides some insights into the development of the competitiveness and the structure of the Austrian merchandise exports. In the last decade, the Austrian foreign trade sector benefited from its location and from its specialisation. The opening of the borders in Eastern Europe in 1990 and the Austrian accession to the EU in 1995 had been the most important events. In these years, the Austrian foreign trade sector successfully specialised into product groups with a strongly growing demand. However, since 2001 the global economy has been changing. The world economy has to cope with rising raw material prices, including oil and agricultural products. As a consequence, shifts in income and demand changed the pattern of the global trade flows.

Austria's geographical distribution of exports reflects its high degree of economic integration with the other industrial countries, especially the neighbouring EU members and the close geographic distance to other emerging markets in Eastern Europe. Austria's product specialisation reflects the importance of one commodity group only, namely the group of machinery and vehicle products. However, the high geographical concentration and product specialisation of trade can be a source of vulnerability due to the sensitivity to cyclical fluctuations in the neighbouring countries. In this context, an interesting question is whether Austria's geographical position and pattern of specialisation remains advantageous in the medium-term future.

The constant-market-shares (CMS) analysis is used to quantify the export performance of a country compared to the rest of the world or single foreign markets. It has the nature of ex-post analyses, like the structural analyses carried out on national macroeconomic accounts or input-output tables. It is an accounting method for decomposing a country's growth of aggregated export shares into a competitiveness effect and a structural change effect. The technique reveals that, even if a country maintains its share of every product in every market, it still can have a decrease in its aggregate market share if it exports to markets that grow more slowly than the world average and/or if it exports products for which demand is growing more slowly than average. The competitiveness effect is the capacity of a country to increase its market share due to competitiveness factors only, independently of structural developments in the market or in the product trade pattern. If a country only exports certain traditional products for which international demand is growing slowly compared to other products, then its total export market share of world trade will decline even if this country succeeds in maintaining its market share in these traditional products. A similar reasoning holds for the geographical distribution of export markets. Therefore a better export performance is achieved through a pattern of exports oriented towards the most dynamic markets and products in world trade.

In CMS analyses there has been no uniform way to solve the continuous-

time problem and in the treatment of the interaction term. The methodology of Milana [1988] proposes satisfactory solutions as the decomposition is applied to discrete observations at the beginning and the end of the period. In this study the Milana [1988] model has been extended by a dynamic development, with the decomposition method applied to each observation of the time horizon. Therefore, the results of the CMS analysis are time series. In order to get a better impression on the long-term development of the indicators, the time series have been smoothed with the Hodrick Prescott (HP) filter. The data source for the CMS analysis is the *OECD, International Commodity Trade Statistics*. The data set consists of the Austrian merchandise exports and the merchandise imports of selected industrialised countries at a disaggregated level. The trade flow of each country is divided into product groups on a one-digit SITC level.

The paper is organised as follows: Section 2 focuses on the theoretical background. Section 3 presents the methodology. Section 4 describes the data. The conclusions are drawn in Section 6.

2 Theoretical background

The constant-market-shares (CMS) analysis became popular in applied international economics with the pioneering work of Tyszynski [1951]. It is a method that disaggregates the trade data of a focus country and compares it with the trade flows of the rest of the world. The CMS analysis is based on the assumption that a country's share in world markets should remain constant over time. The basic identity of the CMS analysis is:

$$q^t \equiv \sum_p q_p^t = \sum_p s_p^t Q_p^t \tag{1}$$

or alternatively:

$$s^t = \sum_p s_p^t S_p^t \tag{2}$$

where

q^t = aggregate exports of the focus country
q_p^t = exports of the p-th commodity of the focus country
Q_p^t = world exports of the p-th commodity
s^t = aggregate exports share of the focus country in total world exports
s_p^t = $\frac{q_p^t}{Q_p^t}$, share of the p-th commodity of the focus country in the p-th commodity of world exports

$$S_p^t = \frac{Q_p^t}{\sum_p Q_p^t}, \text{ share of the } p\text{-th commodity of world exports in total world exports}$$
$$t = \text{time.}$$

The simplest formulation of CMS analyses can be obtained by differentiating Identity 2 with respect to time:

$$\frac{ds^t}{dt} = \sum_p s_p^t \frac{dS_p^t}{dt} + \sum_p S_p^t \frac{ds^t}{dt} \tag{3}$$

In Identity 3 the growth of the aggregate export share of the focus country ($\frac{ds^t}{dt}$) is decomposed into two elements: a structural effect due to changes in commodity shares in the word trade ($\sum_p s_p^t \frac{dS_p^t}{dt}$), and the competitiveness effect ($\sum_p S_p^t \frac{ds^t}{dt}$), which measures the changes of the focus country's exports due only to export share changes in each commodity.

Since Identity 3 refers to continuous-time changes, in cannot be directly applied to discrete-time observations. In the literature there is no uniform way of translating the continuous-time into a discrete-time formulation, because the choice of the weights influences the values and sign of the various elements of the decomposition. Tyszynski [1951] suggested to use year 0 weights to measure the structural effect at constant market shares and year 1 weights to compute the competitiveness component:

$$\Delta s = \sum_p s_p^0 \Delta S_p + \sum_p \Delta s_p S_p^1 \tag{4}$$

Baldwin [1958] employed year 0 weights to compute both the competitive and the structural effect which leaves a residual[1] interacting between the structural and the competitive term:

$$\Delta s = \sum_p s_p^0 \Delta S_p + \sum_p \Delta s_p S_p^0 + \sum_p \Delta s_p \Delta S_p \tag{5}$$

Richardson [1971a] combined Laspeyres- and Paasche-type systems of weights in order to assure consistency in the accounting for changes in the total exports. Focusing on Identity 1, the following alternative decompositions are proposed:

$$\Delta q = \sum_p s_p^0 \Delta Q_p + \sum_p Q_p^1 \Delta s_p \tag{6}$$

[1]Richardson [1971a] interpreted the residual term ($\sum_p \Delta s_p \Delta S_p$) as a second measurement of competitiveness, since it would indicate whether the country was increasing its export shares in rapidly growing commodities and markets.

$$\Delta q = \sum_p s_p^1 \Delta Q_p + \sum_p Q_p^0 \Delta s_p \tag{7}$$

$$\Delta q = \sum_p [\alpha s_p^0 + (1-\alpha) s_p^1] \Delta Q_p + \sum_p [(1-\alpha) Q_p^0 + \alpha Q_p^1] \Delta s_p, \text{ for } 0 < \alpha < 1 \tag{8}$$

$$\Delta q = \sum_p \Delta Q_p^0 + \sum_p Q_p^0 \Delta s_p + \sum_p \Delta s_p \Delta Q_p \tag{9}$$

$$\Delta q = \sum_p \Delta Q_p^1 + \sum_p Q_p^1 \Delta s_p + \sum_p \Delta s_p \Delta Q_p \tag{10}$$

Identities 6 through 10 differ in the weights applied to each component. Identity 8 is a combination of 6 and 7 or of 9 and 10 and uses symmetric weights. Richardson [1971a] finds that no particular one of the identities 6 to 10 has an a priori superiority and suggests to use them jointly because CMS calculations which use only one of the available identities is a waste of resources. In fact, Richardson [1971a] contention is opposite to Milana [1988], who considers Identity 8 superior to the others and demonstrates that the formulation of the CMS analysis defined by this equation, where $\alpha = 0.5$, is the most accurate discrete-time approximation to the total export change between period 0 and period 1.

Richardson [1971a,b] raised another important issue of the CMS analysis. He proposed a decomposition of the structural effect taking into account the market distribution of the focus country's exports of each commodity. Hence, Identity 1 becomes:

$$q^t = \sum_m \sum_p s_{m,p}^t Q_{m,p}^t \tag{11}$$

where $s_{m,p}^t \equiv \frac{q_{m,p}^t}{Q_{m,p}^t}$ and m denotes the m-th market.

In the case where the CMS analysis is expressed in terms of absolute changes of the country's exports Milana [1988] applies the discrete-time decomposition. The system of weights in this version is calculated using an average of the weights of the initial and final year. This choice reflects the fact that a country's export structure and total world trade are changing over time, but that there is no reason to believe that either the structure at the beginning- or end-of-period was dominant throughout the period. The model is determined as follows:

$$\begin{gathered}
\Delta q = \tfrac{1}{2}[s^0 + s^1]\Delta Q + \\
\text{world growth effect} \\
\\
\textstyle\sum_p \tfrac{1}{2}[s_p^0 + s_p^1]\Delta Q_p - \tfrac{1}{2}[s^0 + s^1]\Delta Q + \\
\text{commodity composition effect} \\
\\
\textstyle\sum_m \sum_p \tfrac{1}{2}[s_{m,p}^0 + s_{m,p}^1]\Delta Q_{m,p} - \sum_p \tfrac{1}{2}[s_p^0 + s_p^1]\Delta Q_p + \\
\text{market distribution effect} \\
\\
\textstyle\sum_m \sum_p \tfrac{1}{2}[Q_{m,p}^0 + Q_{m,p}^1]\Delta s_{m,p} \\
\text{competitiveness effect}
\end{gathered} \tag{12}$$

The competitiveness term of the CMS analysis has been formally interpreted by Leamer and Stern [1970] and Richardson [1971b] as demand reaction to given price changes. Implicit in this interpretation is the assumption that price changes are not demand, but supply determined. The structural term of the CMS analysis has been formally interpreted by Merkies and van der Meer [1988]. The authors have illustrated how such an interpretation can be formalised and/or modified by relating CMS analysis to economic theory using a two-stage CES demand function. The world and market terms may be supply determined if total import changes are primarily determined by supply changes. Similarly, the commodity and competitiveness term may be demand determined if allocation changes are primarily determined by demand shifts.

In empirical applications the continuous-time problem of the CMS analysis has been treated in different ways. E.g.: Simonis [2000] analyses the Belgium foreign trade sector. He compares the country's competitiveness and structural pattern with its main trading partners, where Identity 8 provides the basis for the analysis. Fagerberg and Sollie [2002] considered a sample of 20 industrialised countries between 1961 and 1983. The analysis is based on Identity 9, however, the residual term was split into a commodity adoption effect and a market adoption effect. Also the study of Holst and Weiss [2004], which focuses on the export rivalry of the ASEAN members and China, is based on Identity 9.

3 Method

The subsequent analysis is based on the CMS formulation proposed by Milana [1988]. As already mentioned in the previous section, this method considers the information at the beginning and at the end of the observation period only. However, in the time horizon under consideration, both, a country's export structure and world exports are continuously changing. In general, such structural changes

are a source of error in the analysis. Hence, one would like to know the changes in the export shares at every observation during the period under consideration. In the past twenty years, the software applications advanced remarkable, the hardware capacity increased strongly and the quality and the availability of statistics improved. These progresses make the application of CMS analysis much easier today.

In this study the Milana [1988] model was extended by a dynamic procedure. The decomposition method has been applied to every available observation of the time horizon, where the initial observation is denoted as $t-1$ and the final observation is the subsequent year (t), with $t = 1, \ldots, n$. The big advantage of this method is that the interval between initial and final observation are very small. The method helps to avoid disturbances stemming from structural changes in particular when there are many years between the initial and the final period. While Equation 12 generates static results, one obtains time series with this dynamic method for each of the indicators: the total effect, the competitiveness effect, the market distribution effect and the product composition effect. Another advantage of the proposed method is that it shows the time-dependent development of each indicator. These time series may be also used for further research.

In the underlying analysis Equation 12 has been reformulated explaining Δs instead of Δq. The total effect (Δs) is the composite of the competitiveness effect, the two structural effects and the residual effect. The indicator measures the yearly change of the focus country's aggregate export share in world trade. A positive value suggests that the exports of the focus country expand faster compared to the rest of the world; a negative value indicates the opposite.

Total effect:

$$te^t = ce^t + me^t + pe^t + re^t \tag{13}$$

where

$$\begin{aligned} te &= \text{total effect} \\ ce &= \text{competitiveness effect} \\ me &= \text{market distribution effect} \\ pe &= \text{product composition effect} \\ re &= \text{residual effect} \end{aligned}$$

and

$$te^t = \left[\frac{\sum_m \sum_p q^t_{m,p}}{\sum_m \sum_p Q^t_{m,p}} - \frac{\sum_m \sum_p q^{t-1}_{m,p}}{\sum_m \sum_p Q^{t-1}_{m,p}} \right] * 100 \tag{14}$$

with

$$\begin{aligned} q^t_{m,p} &= \text{element}(m,p) \text{ of the reporting country's exports} \\ Q^t_{m,p} &= \text{element}(m,p) \text{ of the world exports at time } t \\ m &= \text{market index} \\ p &= \text{product index} \\ t &= \text{time} \end{aligned}$$

Competitiveness effect:

$$ce^t = \sum_m \sum_p 0.5 * \left[\frac{q^t_{m,p}}{Q^t_{m,p}} - \frac{q^{t-1}_{m,p}}{Q^{t-1}_{m,p}} \right] * \left[\frac{Q^{t-1}_{m,p}}{\sum_m \sum_p Q^{t-1}_{m,p}} + \frac{Q^t_{m,p}}{\sum_m \sum_p Q^t_{m,p}} \right] * 100 \tag{15}$$

Market distribution effect:

$$me^t = \sum_m \sum_p 0.5 * \left[\frac{q^{t-1}_{m,p}}{\sum_p Q^{t-1}_{m,p}} + \frac{q^t_{m,p}}{\sum_p Q^t_{m,p}} \right] * \left[\frac{\sum_p Q^t_{m,p}}{\sum_m \sum_p Q^t_{m,p}} - \frac{\sum_p Q^{t-1}_{m,p}}{\sum_m \sum_p Q^{t-1}_{m,p}} \right] * 100 \tag{16}$$

Product structure effect:

$$pe^t = \sum_m \sum_p 0.5 * \left[\frac{q^{t-1}_{m,p}}{\sum_m Q^{t-1}_{m,p}} + \frac{q^t_{m,p}}{\sum_m Q^t_{m,p}} \right] * \left[\frac{\sum_m Q^t_{m,p}}{\sum_m \sum_p Q^t_{m,p}} - \frac{\sum_m Q^{t-1}_{m,p}}{\sum_m \sum_p Q^{t-1}_{m,p}} \right] * 100 \tag{17}$$

Residual effect:

$$re^t = te^t - ce^t - me^t - pe^t \tag{18}$$

The competitiveness effect (Equation 15) summarises the influence of changes in price competitiveness (assessed by the real effective exchange rate) and changes in non-price competitiveness (expressed by qualitative factors reflecting product differentiation) on export performance. The competitiveness effect reveals the capacity of a country to increase its market share due to competitiveness factors only, independently of structural developments in the market or in the product trade pattern. A positive value indicates a competitive advantage of the exports of the focus country compared to the rest of the world; a negative value indicates a disadvantage.

The market distribution effect (Equation 16) measures the effect stemming from the geographical breakdown of a country's exports. If a country's foreign trade is directed to markets, where the demand is strongly growing, the value of the market distribution effect will be positive. A negative value shows that the exports of the focus country are directed to markets in which demand is growing slower then in the rest of the world. The resulting loss in market share will stem from the market distribution of the country's exports only.

The product composition effect (Equation 17) defines the influence of the product specialisation of a country's exports. Small, open economies usually concentrate their industrial production on a few products only, which they also want to export. The success of specialisation depends on the development of the demand in the foreign markets. If a country specialises into products with a strongly growing foreign demand, than the product composition effect will have a positive pattern. The gain in the market share will be due to the product specialisation only.

The residual effect (Equation 18) embodies all unexplained factors of Equation 13.

4 Data

The data source for the CMS analysis (Equation 14-18) is the *OECD, International Commodity Trade Statistics*. The data set consists of the Austrian merchandise exports and the merchandise imports of selected industrialised countries at a disaggregated level. The imports of all selected industrialised countries have been aggregated to an overall aggregate and to country groups (Table 1). Group 1 consists of the USA, Japan and South Korea. These three countries shall represent the markets overseas. Their common characteristics are: (1) The long geographic distance from the Austrian market; (2) they do not belong the European Monetary Union; (3) they have close economic relations to the other countries in North -, South America and in Asia. Group 2 consists of Germany, France and Italy and is representative for the market in Continental Europe. The group's characteristics are: (1) the close geographical distance to the Austrian economy; the countries belong to the European Monetary Union; (3) they have close trade linkages with the neighbouring countries. The countries of Group 2 are the major trading partners of Austria. Group 3 consists of the United Kingdom and Switzerland. Both countries belong to the major trading partners of Austria. They are located in Europe, but they are not members of the European Monetary Union. The economic structure of both countries is very similar as they have a strongly developed financial sector. Group 4 consists of Hungary, Poland, the Czech Republic, Slovakia and Turkey. This group of countries belongs to the emerging economies and are representative for the markets in Eastern - and

South Eastern Europe. All countries of Group 4 can be characterised by a strong economic growth.

Table 1: Reference countries

Group 1:	USA, Japan, South Korea
Group 2:	Germany, France, Italy
Group 3:	United Kingdom, Switzerland
Group 4:	Hungary, Poland, Czech Republic, Slovakia, Turkey

The merchandise exports and all the merchandise imports of the reference countries have been considered by commodity groups on a one-digit SITC level (Table 2).

Table 2: Commodity groups (one-digit SITC level, 3rd Revision)

0	Food and livestock
1	Beverages and tobacco
2	Primary commodities (excluding crude oil)
3	Combustibles and energy
4	Oils and fates
5	Chemical products
6	Manufactured goods
7	Machinery and vehicle products
8	Other finished products

The CMS-analysis has been carried out for the time horizon 1990 to 2006. The dollar values of exports and imports have been converted into euro. Only the flows greater than one million euro entered into the analysis. Hence, 300,000 observations have been considered.

To get an impression on the long-term development of the output of Equations 14-17, the time series have been smoothed with the Hodrick Prescott (HP) filter. This method is particularly used to obtain a smoothed non-linear representation of a time series, that is more sensitive to long-term than to short-term fluctuations. The filtering is optimal when there exists an I(2) trend in the data and when the noise of the data is normally distributed with $N \sim (0, \sigma^2)$.

The method decomposes the original series (x_t) into a trend component (g_t) and a cyclical component (c_t).

$$x_t = g_t + c_t \tag{19}$$

Then the HP filter isolates the cycle component by the following minimisation

problem:

$$min \sum_{t=1}^{T}(x_t - g_t)^2 + \lambda \sum_{t=2}^{T-1}[(g_{t+1} - g_t) - (g_t - g_{t-1})]^2 \tag{20}$$

The first term of Equation 20 is a measure of fitness of the time series while the second term is a measure of smoothness. The penalty parameter λ controls the smoothness of the series g_t. If λ equals 0 the trend component becomes equivalent to the observed time series. The larger the λ, the smoother the g_t. As $\lambda \to \infty$, g_t approaches a linear trend. In the underlying analysis the integer value for the smoothing parameter λ is set to 100.

5 Results

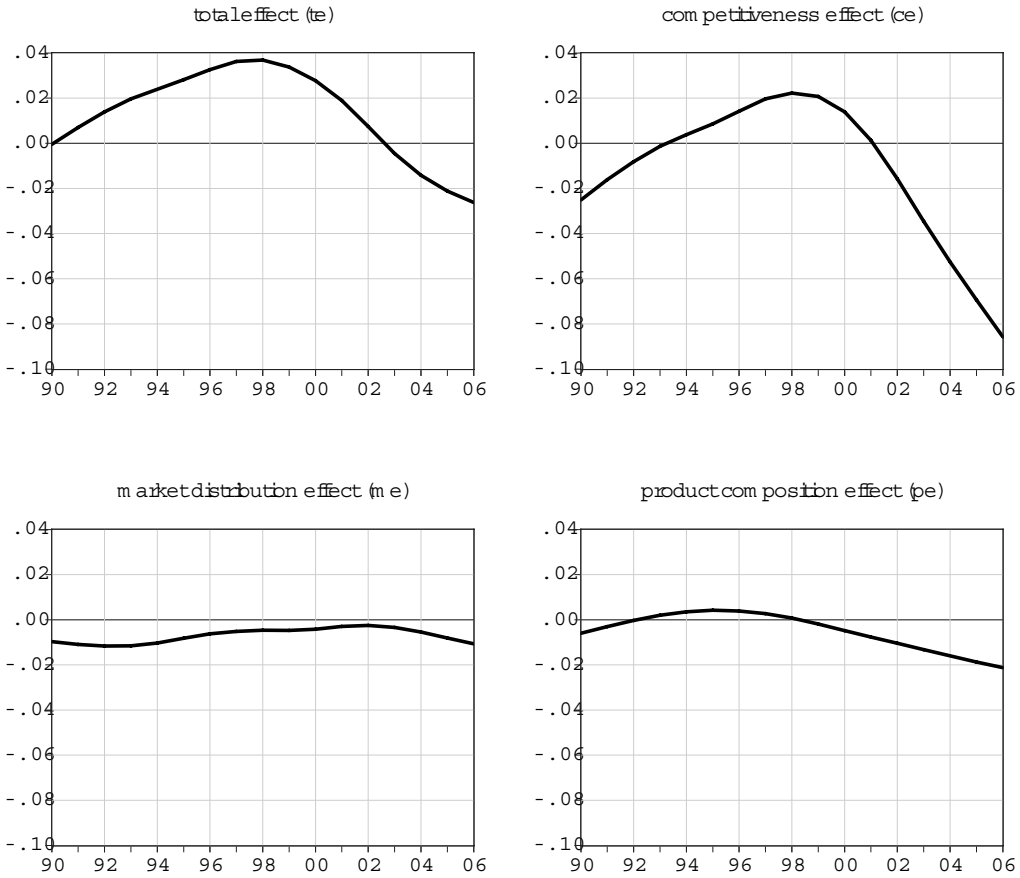
The total effect (te), the competitiveness effect (ce), the market distribution effect (me) and the product composition effect (pe), are the deviations from the assumption that the share of the Austrian merchandise exports as measured by imports of the reference countries remains unchanged. Hence, a zero value points to a synchronous development of both markets. A reading above zero indicates a gain in the market share of the Austrian exports compared to the foreign sector of the reference countries and a reading below indicates a loss. The results of the Equations 14-17 are displayed in Table 3 and in the Tables 4-7 of the Annex. The long-term development of the four effects, derived from Equation 19 and 20, are shown in the Figures 1-5. In the figures, the zero line reflects the synchronous (break even) development in the long-term. A plot above the zero line indicates a long-term gain in market share and a plot below the zero line indicates a loss.

5.1 Austria vs. the aggregate of all reference countries

From 1990 to 2006 the Austrian foreign trade sector was able to maintain its market share in the global environment. The variations from break-even of the four effects are very small. The long-term view (Figure 1) suggests, that the Austrian gain in market share during the 1990s was attributed to improvements in the country's competitiveness and product composition, while the orientation to strongly growing markets shows some weakness. From 2002 onwards, all four effects show a downward sloping trend.

As reported in the first column of Table 3, the total effect was positive from 1990 to 1993 and from 1997 to 2002. The Austrian exports could slightly gain market share during the global economic slowdown at the beginning of the 1990s, during the Asian crisis and in the recession years 2001/2002. In contrast to this development, the Austrian foreign trade sector lost market share in the years

Figure 1: Austria vs. all reference countries, long-term trends



Left axis: changes in percentage points

2003 to 2005, when the global economy was booming. This development points to the fact, that the Austrian foreign sector remains robust against the cyclical fluctuations of the global economy.

The gain in market share during the 1990s is primarily attributable to the positive competitiveness effect, revealing the capability of a country to increase its market share due to competitiveness factors only, independently of structural developments in the market or in the product trade pattern. In fact, in the second half of the 1990s, the Austrian foreign trade sector benefited from a weak euro compared to the major currencies and from the moderate increase in export prices. The advantages in the competitiveness vanished as soon as the world economy had to cope with the strongly increasing import prices for crude oil, metals and agricultural products. The most striking development for the Austrian external sector was, however, the appreciation of the euro against the US dollar.

The direction change in the development of the currency implied for the Austrian foreign sector an immediate loss in the competitiveness as one can see in the top-right of Figure 1 and in the second column of Table 3.

In Figure 1, bottom-left, it's shown that the market distribution effect moves slightly below break-even. Since the market distribution effect measures the impact stemming from the geographical breakdown of the Austrian exports, Austria's geographical trade pattern reflects its high degree of economic integration with the other industrial countries, especially the neighbouring EU members and the close geographic distance to other emerging markets in Eastern Europe. More than two-thirds of the Austrian exports are shipped to the other member countries of the European Union. The Austrian exports to Germany alone account for 30 percent in the total exports, 13 percent of the exports are directed to the neighbouring Eastern European economies. However, in Table 3, third column, some fluctuations of the indicator are traceable. From 1995 to 2003 the effect of the Austrian market structure was positive. In these years, the goods exporting industries of Austria succeeded to take full advantage of the strongly growing demand in the neighbouring countries. Since 2004, however, the development of the market structure effect reveals, that the Austrian foreign sector has no longer been able to exhaust the potential of the foreign markets.

Figure 1, bottom-right and Table 3, fourth column shows the Austrian product structure effect. The indicator defines the influence of the product specialisation of a country's exports. The Austrian product structure effect has slightly improved during the second half of the 1990s, however, from 1999 onwards, the Austrian export oriented industries have lost market share attributable to the product specialisation. The recent decline of the product structure effect also suggests that the current pattern of specialisation could be a source of vulnerability for the Austrian foreign sector in the coming years, as Austrian export oriented industries have particularly specialised in machinery and vehicles, which have a share of 40 percent in the total Austrian exports. The exports of manufactured goods account for 20 percent in total exports and the exports of chemical products account for 9 percent.

5.2 Austria vs. country groups

In the previous section it was found that the Austrian trade pattern, compared to the aggregate of the reference countries, shows only slight deviations from break even. The comparison of the Austrian trade with the pattern of the Groups 1-3 shows similar results. The smoothed effects move in an interval between -0.6 to 1 percentage points. In contrast to this, the comparison with Group 4 shows that the effects move between -50 to 25 percentage points. These differences in the results point out that, within the years observed, the trade structures of Group 4 have been changing strongly during 1990 to 2006.

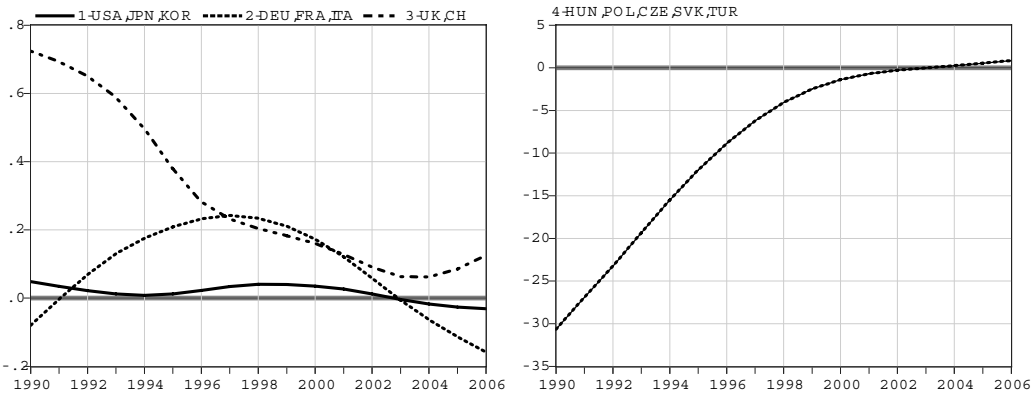
Table 3: CMS — Austria vs. all reference countries
changes in percentage points

	te	ce	me	pe	re
1990	-0.07	-0.12	0.05	-0.03	0.04
1991	0.03	0.06	-0.05	-0.00	0.03
1992	0.00	-0.03	0.01	0.00	0.02
1993	0.21	0.16	-0.07	-0.00	0.13
1994	-0.10	0.01	-0.11	0.02	-0.02
1995	-0.09	-0.20	0.06	0.03	0.02
1996	-0.10	-0.19	0.07	-0.02	0.04
1997	0.21	0.20	-0.01	0.00	0.02
1998	0.16	0.01	0.10	0.06	-0.01
1999	-0.01	0.10	-0.12	-0.02	0.03
2000	0.01	0.18	-0.15	-0.06	0.04
2001	0.25	0.15	0.09	0.00	0.01
2002	0.04	-0.01	0.05	0.01	-0.01
2003	-0.24	-0.31	0.06	-0.02	0.03
2004	-0.11	-0.10	-0.01	-0.01	0.01
2005	-0.15	-0.08	-0.07	-0.05	0.05
2006	0.17	-0.03	-0.01	-0.00	0.21

Figure 2 shows the total effect in the long-run. Despite the long geographic distance and the existent currency risk, the Austrian foreign trade sector was able to maintain its export market share in Group 1. During the 1990s, the Austrian foreign sector could increase its market share compared to the import development of Group 2. From 2002 onwards the Austrian export sector expands slower than the import development of Group 2. The Austrian market share in Group 3 shows a positive development, however, the effect performs a gradually declining trend, though from a high level. Since 2004 the percentage change of the total effect stagnates slightly above zero. From 1990 to 2000 the Austrian foreign sector was able to conquer the emerging markets (Group 4). From 2001 onwards, an almost synchronous development with the Group 4 is observable.

Figure 3 compares the competitiveness effect of the groups. It shows that until 2002, the Austrian foreign sector was able to maintain its competitiveness compared to the markets overseas. Compared to Group 2, the Austrian foreign sector has scored an advantage in the competitiveness, attributable to moderate export price increases and strong productivity gains. In the subsequent years, the Austrian foreign sector lost its comparative advantage compared to Group 1 and 2. Since the second half of the 1990s, disadvantages in the competitiveness emerged in the Austrian foreign trade sector compared to Group 3. In Group

Figure 2: Total effect, long-term trends



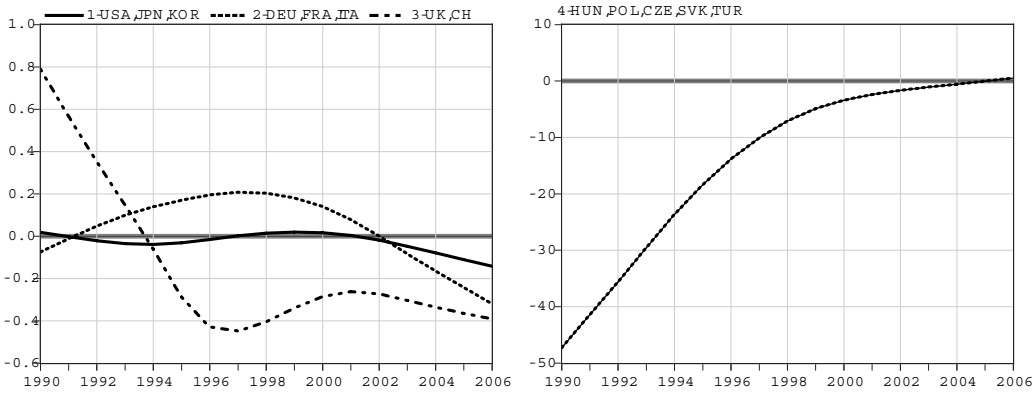
Left axis: changes in percentage points

4 the big disadvantages, which were observable at the beginning of the 1990s, declined in the following years and they have disappeared after 2002. Due to the increasing income, the economies of Group 4 lost their comparative advantage vis-a-vis Austria.

As shown in Figure 4 the market structure effect of Group 1 and 2 deviates only slightly from break even. However, after 2002, both country groups could intensify their trade links to markets, which exhibit a stronger dynamic in demand than the Austrian trading partners. The Austrian market structure effect, compared to group 3, was positive between 1992 and 2006. This result emphasises the advantage of location of the Austrian market compared to this group of countries, as they are located in a greater geographic distance to the strong growing markets in Eastern Europe. Compared to Group 4, the advantage of location of the Austrian foreign trade sector has been turning into a disadvantage after 2000, as the emerging markets intensified their trade links to strongly growing economies like Russia, China and India.

During the 1990s, the product specialisation of the Austrian foreign trade sector which concentrates primarily on one commodity group only turned out to be an advantage. Figure 5 suggests that in those years the Austrian foreign sector gained market share due to its product specialisation compared to Group 1, 2 and 3. However, after the middle of the 1990s the attractiveness of the Austrian product supply faded. As of 2000, the specialisation effect adversely affected the trade performance in Group 1 and 2. The product specialisation effect, which compares Austria with Group 3 contracted the strongest. Compared to Group 4, the big advantage of the Austrian product specialisation, which was obtained during the 1990s also vanished. A slight adverse development has been observed

Figure 3: Competitiveness effect, long-term trends



Left axis: changes in percentage points

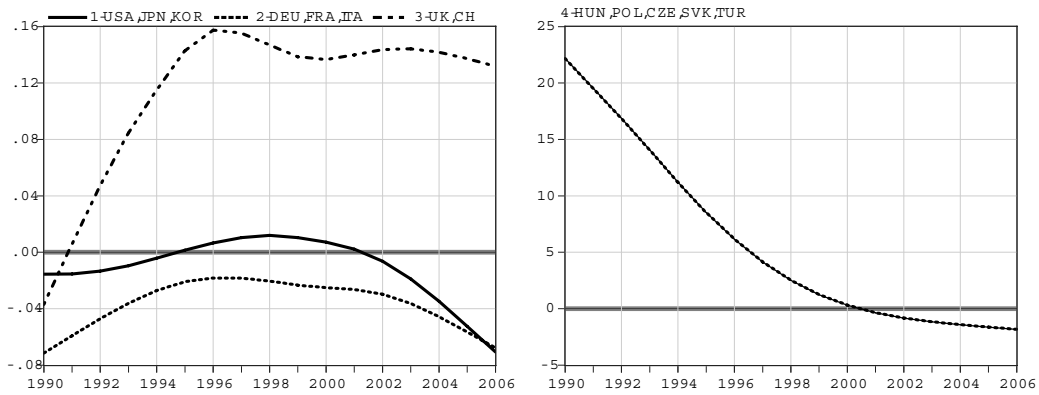
since that time.

6 Conclusion

In the 1990s, the Austrian foreign trade sector benefited from its location and specialisation. The opening of the borders in Eastern Europe in 1990 and the accession to the EU in 1995 had been the most striking events for the Austrian foreign trade sector. In these years, the Austrian foreign trade sector expanded rapidly as it successfully specialised into product groups with a strongly growing foreign demand. However, since 2001 the global economy has been changing. The world economy has to cope with rising raw material prices, including oil and agricultural products. As a consequence, shifts in income and demand changed the pattern of the global trade flows. Therefore, in particular the export driven economies have to adjust swiftly to the change in foreign demand. A strong geographical concentration and product specialisation of trade can be a source of vulnerability due to the sensitivity to cyclical fluctuations in the neighbouring countries. Hence, this analysis provides some insights into the development of the competitiveness and the structure of the Austrian merchandise exports from 1990 to 2006.

For the analysis of the Austrian trade performance a constant-market-shares (CMS) analysis was applied. The methodology suggested by Milana [1988] has been transformed to a dynamic model, such that all variables of the CMS model are now time series. They have been smoothed with the Hodrick Prescott (HP) filter which gives a better overview of the long-term development of each indi-

Figure 4: Market distribution effect, long-term trends



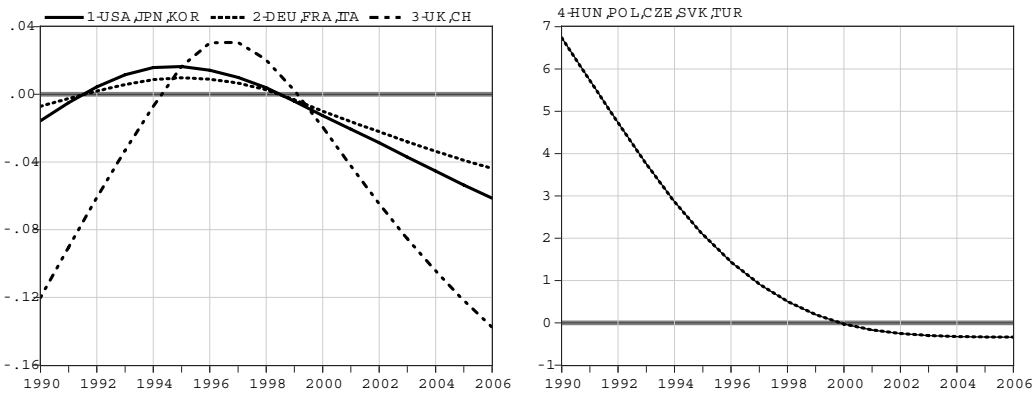
Left axis: changes in percentage points

cator compared to the other applications. The present dynamic consideration of the CMS-analysis helps to track all changes in the trade structure and competitiveness over time. It is superior to traditional methods which consider only an initial and a final period, because ignoring the information between the two data points might lead to a bias in the results.

The analysis shows that the Austrian foreign trade sector was able to maintain its market share in the global environment. The total effect, the competitiveness effect, the market distribution effect and the product specialisation effect all show only slight deviations from zero. The long-run view suggests that the Austrian gain in market share during the 1990s is attributable to improvements in the country's competitiveness and product composition, while the orientation towards strongly growing markets shows a slight weakness. From 2002 onwards, the Austrian foreign sector has suffered losses in market shares due to its competitiveness and structure.

While the performance of the Austrian foreign trade only slightly deviates from the pattern of the traditional industrialised countries a strong structural change takes place in the foreign trade of the emerging markets. Due to the increase in income in this country group, the disadvantage in the competitiveness of the Austrian trade sector has vanished. However, disadvantages arise for the Austrian foreign trade sector from the changes in the market distribution and product composition. The two effects, which were strongly positive during the 1990s, show a negative trend after 2000. The result of the analysis suggests that in the years to come the market distribution and product composition could be a source of vulnerability in the Austrian foreign trade sector.

Figure 5: Product composition effect, long-term trends



Left axis: changes in percentage points

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A Tables

Table 4: CMS — Austria vs. Group 1
changes in percentage points

	te	ce	me	pe	re
1990	0.14	0.15	0.18	-0.15	-0.04
1991	0.15	0.30	-0.23	0.05	0.03
1992	0.06	-0.02	-0.02	-0.01	0.11
1993	0.09	-0.29	-0.11	0.07	0.43
1994	-0.63	-0.65	0.04	0.11	-0.14
1995	-0.10	-0.16	-0.00	0.05	0.01
1996	-0.15	-0.15	0.01	-0.06	0.06
1997	0.38	0.40	0.00	-0.00	-0.02
1998	0.55	0.30	0.24	0.13	-0.12
1999	-0.16	-0.04	-0.13	-0.04	0.05
2000	-0.24	-0.06	-0.19	-0.15	0.16
2001	0.62	0.43	0.18	-0.01	0.02
2002	0.12	0.20	0.07	0.05	-0.19
2003	-0.34	-0.37	0.08	-0.09	0.03
2004	-0.18	-0.11	-0.05	-0.01	-0.01
2005	-0.45	-0.38	-0.13	-0.12	0.18
2006	0.40	-0.03	-0.12	-0.03	0.58

Table 5: CMS — Austria vs. Group 2
changes in percentage points

	te	ce	me	pe	re
1990	-0.56	-0.47	-0.08	-0.02	0.03
1991	-0.10	0.03	-0.15	-0.03	0.04
1992	0.06	-0.09	0.00	0.01	0.14
1993	1.18	1.05	-0.09	-0.06	0.28
1994	-0.14	-0.20	0.02	0.10	-0.05
1995	-0.28	-0.49	0.13	0.09	0.01
1996	0.11	0.11	-0.01	-0.09	0.09
1997	0.96	0.99	-0.04	0.03	-0.02
1998	0.10	-0.24	0.14	0.15	0.05
1999	0.09	0.34	-0.33	-0.03	0.11
2000	0.55	0.78	-0.21	-0.14	0.12
2001	0.57	0.41	0.15	0.00	0.01
2002	0.20	0.15	0.09	-0.01	-0.03
2003	-0.99	-1.11	0.07	-0.03	0.08
2004	-0.34	-0.33	-0.07	-0.02	0.09
2005	-0.29	-0.16	-0.13	-0.11	0.11
2006	0.30	-0.21	-0.11	0.01	0.61

Table 6: CMS — Austria vs. Group 3
changes in percentage points

	te	ce	me	pe	re
1990	-0.37	1.85	-0.12	-0.17	-1.94
1991	0.99	-0.81	-0.26	-0.13	2.19
1992	0.32	-0.25	0.11	-0.03	0.49
1993	2.18	-0.77	0.85	-0.02	2.13
1994	4.58	12.33	-1.46	-0.69	-5.60
1995	-1.49	-7.16	0.91	0.32	4.44
1996	-4.81	-10.04	1.57	0.77	2.90
1997	1.12	1.26	-0.31	0.02	0.15
1998	0.79	0.63	0.17	0.07	-0.08
1999	0.45	0.84	-0.63	-0.10	0.35
2000	1.11	1.41	-0.16	-0.10	-0.04
2001	1.45	1.34	0.19	-0.10	0.02
2002	0.10	0.35	0.52	-0.19	-0.57
2003	-1.70	-1.70	0.28	-0.10	-0.18
2004	-0.65	-0.87	0.12	-0.09	0.18
2005	-0.68	-0.70	0.12	-0.27	0.17
2006	1.75	-0.04	0.04	0.01	1.75

Table 7: CMS — Austria vs. Group 4
changes in percentage points

	te	ce	me	pe	re
1990	-38.31	-56.58	19.78	7.80	-9.31
1991	12.20	7.03	-10.73	6.02	9.88
1992	-82.13	-123.65	35.56	8.76	-2.80
1993	-21.40	-23.08	29.60	2.56	-30.48
1994	6.05	6.79	1.99	-0.42	-2.31
1995	-9.58	-10.93	0.60	0.68	0.07
1996	-9.47	-12.78	1.73	0.84	0.73
1997	-1.38	-3.40	0.50	0.56	0.97
1998	0.48	-1.36	0.97	1.26	-0.39
1999	4.82	4.86	-0.59	-0.25	0.80
2000	-1.06	-0.15	-1.22	-1.48	1.79
2001	3.77	-11.75	0.11	0.66	14.75
2002	-3.78	-3.70	0.37	0.26	-0.70
2003	-7.74	-7.67	0.01	-0.03	-0.05
2004	-4.30	-4.30	0.47	-0.19	-0.29
2005	-1.52	-0.79	-1.13	-0.22	0.61
2006	3.24	0.87	-0.10	0.35	2.12

Author: Edith Skriner

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