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Exports Margins in Austria's Export Growth

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Abstract: Recent empirical research in international trade emphasizes the role of the extensive and intensive margin as determinants of countries' trade patterns. Considering the case of Austria, the present paper uses detailed bilateral export data with 215 partner countries over the period 1998-2011, differentiated by product categories where we distinguish between total goods, final goods and intermediate goods, in order to calculate the contribution of the extensive and intensive margins to Austria's export performance. Intensive margin are further decomposed into price and quantity margins in order to evaluate the role of to changes in price (quality) and changes in quantity. Unlike previous studies that have mainly used a single approach for the decomposition of exports into its margins, the present paper uses three alternative methods: i) the count method, ii) the decomposition method of export shares proposed by Hummels and Klenow (2005), and iii) the decomposition method of export growth rates by Bingzhan (2011). Results show that the intensive margin is key driver of Austria's export growth across each product category. Additionally, the results indicate that the growth in the intensive margin of Austria's exports is mainly explained by quantity growth.

JEL Codes: F12, F14, F15

Keywords: Austria, Euro, export margins

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I. Introduction

From 1998 to 2011, Austria's nominal exports have increased on average by 7.08 percent each year and amounted to 137.6 billion U.S. dollars in 2011 (See Table 1). Exports can grow for a variety of reasons: by exporting existing products to old destinations at higher volumes and/or higher prices (intensive margin); or by exporting existing varieties to new destinations or exporting new varieties to old and/or new destinations (extensive margin). This paper studies the role of the extensive and intensive margins in explaining this stunning growth of Austria's exports across different types of products, thereby adding to a growing number of studies considering in detail the export performance of single countries (Amiti and Freund, 2008; and Minondo and Requena, 2008; and Bingzhan, 2011).

The present paper decomposes Austria's exports to 215 importing countries over the period 1998-2011 into extensive and intensive margins using three different methods: the count method, the decomposition method of export shares developed by Hummels and Klenow (2005) and the decomposition method of export growth rates proposed by Amiti and Freund (2008) and extended by Bingzhan (2011). We further decompose intensive margin into price and quantity margin to determine whether the rise in Austria's exports is due to changes in quality (price) or to changes in quantity. Using three different techniques thus allows us to obtain robust and clear-cut results for the role of the extensive and intensive margins in the growth of Austria's export.

From a policy perspective, it is important to establish whether exports growth is driven by the extensive or the intensive margin. If export grows at the extensive margin, this can be interpreted as export diversification, which in turn has been both theoretically and empirically

linked with sustainable economic growth.¹ However, if the intensive margin, particularly quantity component, plays a significant role in the growth of a country's exports, this would generally be seen as a unpleasant outcome in terms of the sustainable economic growth because the country needs a lot of resources, including capital, labor, natural resources and imported inputs, to export more, putting further pressure on the country's current account balance. In contrast, if the price component of the intensive margin (assuming that higher prices are regarded as evidence for higher quality) account for the most important share of the export growth, this can be considered as helpful development for achieving sustainable economic growth giving the fact that research and development spending, the level of human capital and technological innovation activities are key ingredients in improving the level of product quality. Hence, determining the true nature of the country's export growth helps policy makers to make rational policy decisions in increasing the global competitiveness of the country. In addition, establishing the fact that Austria's export growth is the result of either a higher number of varieties (gain from variety) or higher quantity of exported products or higher price of exported products provide a new insight into the impact of export growth on the welfare of Austria.

The major findings can be summarized as follows. Using these three different methods, we derive similar conclusions: therefore, our results are robust for different methods. Nonetheless, all three methods indicate that intensive margin contributes in various degrees to Austria's exports. We also find that the quantity margin accounts for significant portion of growth in Austria's final goods exports and intermediate goods exports. Finally, the results obtained by all three methods suggest that the growth rates of each margin are generally larger

¹ Recent empirical models highlighting a positive link between export diversification and growth include Dutt et al. (2008) and Lederman et al. (2011). For example, using bilateral exports data for more than 150 countries over the period 1962-1999, Dutt et al. (2008) show that an increase in the extensive margin of exports is much more effective in raising per capita income than increasing the intensive margin of exports, especially if the initial pattern of export specialization is close to that of the US.

in Austria's exports (total goods, final goods, and intermediate goods) to the Extra-Euro and the Extra-EU regions than the Intra-Euro and the Intra-EU regions, reflecting the fact that new destinations are crucial in Austria's export growth.

The remainder of the paper is organized as follows. Section II provides a brief literature review on the topic in hand while Section III briefly outlines three methods used in the calculations of export margins: the count method, the decomposition method of export shares developed by Hummels and Klenow (2005) and the decomposition method of export growth rates proposed by Amiti and Freund (2008) and extended by Bingzhan (2011). Section IV presents the data used to calculate the export margins. The Section V provides an overview of Austria's exports to the selected destination countries and regions. The Section VI reports the results from three methods for Austria's total goods exports as well as for final and intermediate goods exports. Section VII summarizes the main findings and concludes.

II. Literature Review

There is ongoing discussion in the trade literature about the relative importance of extensive and intensive margins in explaining export growth. For example, using data on shipments by 126 exporting countries to 59 importing countries in 5000 product categories, Hummels and Klenow (2005) show that the extensive margin accounts for 60 percent of the increase of exports of larger economies. The importance of the extensive margin in export growth was also documented by Evenett and Venables (2002) for exports of 23 developing countries, Berthou and Fontagne (2008) for French exports to the euro area countries, Bernard et al. (2009) for US exports, and Dutt et al. (2011) for more than 150 countries' exports. In contrast, several other studies have found that the intensive margins played more important role in export growth than does the extensive margin. Using data 158 countries over the period 1970

to 1997, Helpman et al. (2008) show that the rapid growth of trade was mostly driven by the intensive margin. Examples of papers that have shown the importance of the intensive margin in export growth include Felbermayr and Kohler (2006) for world trade, Eaton et al. (2007) for Colombian exports, Amiti and Freund (2008) for Chinese exports, Amurgo-Pacheco and Pierola (2008) for exports of 24 developed and developing countries, Besedes and Prusa (2010) for manufacturing exports of 46 countries, Bingzhan (2011) for Chinese exports. Overall, the empirical literature so far predominantly suggests that the growth of exports comes mainly from exporting more in existing varieties rather than from exporting new varieties.

This contradictory evidence might be due to the use of different definitions of extensive and intensive margins in the empirical literature (Besedes and Prusa, 2010). There are many ways to measure the extensive and the intensive margins of exports. The first method, often cited as the count method, is one of the most commonly used methods for calculation of the extensive and intensive margin in the literature. In this method, the extensive margin is defined as the count of the number of products or the number of trading partners to which a country exports, while the intensive margin is defined as exports per product variety (See for example, Dutt et al., 2011). In a dynamic setting (time series context), however the extensive and intensive margins are slightly differently defined: the extensive margin refers to the growth of exports in new categories between two periods in time while the intensive margin is defined as the growth of exports in goods that are already being exported in both periods (See, for example Flam and Nordström, 2006; Amiti and Freund, 2008; Bernard et al., 2009; Besedes and Prusa, 2010; and Bingzhan, 2011).² Time series measures of changes in the extensive and intensive margins, therefore, more or less explain the relative contribution of each margin to the

² Besedes and Prusa (2010) define the extensive margin similarly to the existing literature but propose an alternative definitions of the intensive margin in terms of survival and deepening.

country's trade (export) growth over time. Recently, Amurgo-Pacheco and Pierola (2008) further add the geographic dimension in addition to the product diversification in the calculation of the extensive and intensive margins in the time series context. In Amurgo-Pacheco and Pierola (2008), the extensive margin correspondingly refers to old products (existing varieties) being exported to new destinations, or new products being exported to old destinations or new products to new destinations. On the other hand, the intensive margin consists of old products being exported to old destinations in both periods.

As noted in Hummels and Klenow (2005), one drawback of the count method is that this method gives equal weight to small and large products (markets), thereby assigning a large importance to product categories in which only a single country exports a lot. Hummels and Klenow (2005) have proposed a method where each product is weighted according to its share in world trade (exports). Building on the methodology of Feenstra (1994), Hummels and Klenow (2005) decompose the shares of one country's exports in the world market into two margins: the extensive margin and intensive margin, which is further divided into price (quality) and quantity components. In this decomposition, the extensive margin is defined as a weighted count of the categories (products) in which a country exports relative to the categories exported by the rest of the world. In contrast, the intensive margin is defined as a country's nominal exports relative to world's nominal exports in a set of categories in which the country also exports. Therefore, the extensive margin can be thought of as a measure of export variety while the intensive margin as measure of the trade volume of each variety.³ This method has two advantages. First, it takes differences in the importance of product groups (in terms of market shares) into account. Second, it enables researchers to further

³ Dutt et al. (2011) have examined the results of the count method and the Hummels and Klenow (2005) method and found that both methods produced comparable results: the correlation between the count measure and the Hummels and Klenow extensive margin equals 0.86 and correlation between exports per product measure and the Hummels-Klenow intensive margin measure equals 0.88.

decompose the intensive margin into price and quantity component, which is not possible to carry out the decomposition using the count method. Researchers that have employed this approach include Bergin and Lin (2008, 2012), Van Hove (2010), Dutt et al. (2011), and Foster et al. (2011). Some empirical studies, however, have utilized both methods to check the robustness of their empirical calculations (Kehoe and Ruhl, 2002; Dutt et al., 2011).

The last method of measuring the extensive margin and intensive margin, proposed by Amiti and Freund (2008), and further developed by Bingzhan (2011), is mainly an extension of the decomposition in Hummels and Klenow (2005). Bingzhan (2011) extend the approach of the Hummels and Klenow's method by decomposing export growth into the extensive margin growth rate, the intensive margin growth rate, the later one is further decomposed into price growth rate and quantity growth rate. The major difference between these two methods is that the Hummels and Klenow method accurately decomposes the export shares, whereas the second method accurately decomposes export growth.

From a theoretical perspective, traditional trade theories have been considered to be inadequate in explaining the source of the export growth because in these theories goods are assumed to be perfectly homogenous, i.e. there is no trade in horizontally differentiated goods or vertically differentiated goods. Consequently, a country's export growth is solely the result of a higher quantity of exported goods so that there is no extensive margin or price (quality) component of the intensive margin in these models. However, we know that products have two attributes – variety and quality. In a well-known paper, Armington (1969) emphasize the role of the intensive margin in explaining the growth of exports. In Armington's (1969) model, it is assumed that products traded internationally are differentiated on the basis of their country of origin. He assumes that each country produces only one variety in each category

of goods and that product is different from the product of the same category from any other country, so that there is no export growth at the extensive margin. In this model, countries can export more only by decreasing their prices relative to those charged by other countries, leading to unfavorable terms of trade effects. On the other hand, the monopolistic competition model developed by Krugman (1979, 1980, and 1981) explain horizontal intra-industry trade by emphasizing the importance of economies of scale, product differentiation, and demand for variety within the setting of monopolistic competition type markets. The Krugman monopolistic competition model assumes that the each country specializes in a range of varieties and predicts that the number of varieties produced in a country is proportional to country size. In contrast with the Armington model, the Krugman model predicts that a country export more only through the extensive margin (a greater range of varieties) in the sense that it exports the same quantity per variety and export at the same unit prices.⁴

As suggested by Flam and Helpman (1987), Falvey and Kierzkowski (1987), countries also engage in two-way trade (intra-industry trade) in vertically differentiated goods that are different in terms of quality. In particular, Falvey and Kierzkowski (1987) suggest that the amount of capital relative to labor used in the production of vertically differentiated good indicates the quality of good. As a consequence, in an open economy, higher-quality products are produced in capital abundant countries whereas lower-quality products are produced in labor abundant countries. This will give rise to intra-industry trade in vertically differentiated goods: the capital abundant country exports higher-quality varieties and labor abundant

⁴ Hummels and Klenow (2005) have recently showed that the extensive margin accounts for large fraction of total increase in exports of larger economies, which is inconsistent with the Armington model but consistent with the predictions of the Krugman model. However, the findings of Hummels and Klenow (2005) do not support the hypothesis of the Krugman model that the number of varieties produced in a country is proportional to country size.

country exports lower-quality products. The models of vertical IIT thus suggest that export growth can be result of the quality (price) differences of the traded products.⁵

More recently, based on the Krugman's (1980) model, Melitz (2003) develops a dynamic industry model with heterogeneous firms to analyze the intra-industry effects of international trade.⁶ According to this model, the firm participation in export markets solely depend on firm productivity and export (or trade) costs (a combination of both fixed export costs and variable export costs). The model shows that the existence of the export costs allows only the most productive firms to enter export markets when a country opens up to trade while forces the least productive firms to exit. In this model, a fall in both variable and/or fixed export costs between all countries have a number of implications for export growth which can be decomposed into extensive margin (i.e., number of firms) and intensive margin (i.e., average exports per firm). The Melitz model predicts that a decline in variable export costs raises the extensive margin because falling variable export costs allows new and less productivity firms, which are just below the productivity threshold, enter the export markets. Moreover, a reduction in variable export costs enables existing exporters to increase their sales to export markets (intensive margin). On the other hand, reductions in both fixed and variable export costs also induces new and less efficient firms to enter the export markets, thus implying a drop in average sales per firm (intensive margin). As a result, a fall in export costs has an ambiguous effect on the intensive margin. In addition, a decline in the fixed export costs will not affect the sales of existing exporters (intensive margin). Hence, the Melitz model predicts

⁵ Flam and Helpman (1987) also studies vertical differentiation in products but there is slight difference from Falvey and Kierzkowski's (1987) model. In their model, labor is the only factor used to produce the differentiated goods and assumed that labor input per unit output of the differentiated product differs across countries whereas in Falvey and Kierzkowski (1987) model, the capital is major factor to determine the quality of product. These labor-input requirements determine the level of quality. The pattern of trade is thus determined by cross-country differences in technology (labor-input requirements per unit of output), income and income distribution.

⁶ Many extensions or applications of the Melitz model may be found in the literature: notably Helpman et al. (2008), Chaney (2008), Lawless (2010), and Besedes and Prusa (2010).

that a fall in both fixed and variable export costs have a positive effect on the extensive margin. However, the prediction of the model for the intensive margin is ambiguous (Lawless, 2010: 1156).

III. Austria's exports and export margins

3.1. Decomposition methods

In this section, we present first the alternative decomposition methods employed in the following: the count method, the decomposition method of export shares by Hummels and Klenow (2005), and finally the decomposition method of export growth rates by Amiti and Freund (2008) and extended by Bingzhan (2011).

Each method has its strengths and weakness. The count method is quite easy to implement but gives only a rough indication of the role of each margin in export growth, since it assigns equal weight to all observed product categories. The approach by Hummels and Klenow (2005) addresses this shortcoming by weighting categories of goods by their overall importance in exports to a given country; hence, it prevents a category from appearing important solely because an exporter exports a large quantity in a certain category. A natural extension to the dynamic dimension is the approach by Bingzhan (2011), which focuses on export growth and provides an accurate decomposition of export growth to each margin (though it is silent on the overall importance of each margin for total trade as given by the levels approach). Given that there is no approach that is a priori preferable on theoretical grounds and given the variety of results obtained in previous studies that have employed different approaches, the present paper investigates the evolution of Austrian exports using all three approaches, allowing to identify results that are robust to the method used.

For all three approaches, bilateral export relationships are classified as in Amurgo-Pacheco and Pierola (2008), accounting for both product diversification (introduction of new varieties) and geographic diversification (introduction of new export partners). More specifically, a bilateral export relationship is created when a country begins to export an existing product (variety) to a new destination country or a new product to old destination or new destination in both periods. With this most comprehensive definition of the extensive margin, the estimated contributions of the extensive and intensive margin should be regarded as upper and lower bound respectively.

Before turning to a description of the methods use, let us introduce some notation that will be used for Austrian export data in the following. Individual product categories are indexed by $i = 1, \dots, I$, time periods by $t = 1, 2, \dots, T$, and destination countries by $m = 1, \dots, M$, and (larger groups of countries, i.e.,) regions by $r = 1, \dots, R$. The variable p_{mit} is the price (in U.S. dollars) of product i exported from Austria to destination country m in period t and is calculated as the ratio of the export value to the quantity exported (q_{mit}). Since we focus on a single exporter country (Austria) in the empirical part of the paper, we omit the index (j) for the exporting country for notational simplicity.

3.1 Count method

The count method essentially uses a descriptive approach by giving equal weight to all product categories and destination countries. The (static) bilateral extensive margin in year t , referred to as EM_{mt}^I , is then defined as the number of products i that have been exported from Austria to trading partner m :

$$EM_{mt}^I = \sum_{i \in I_{mt}} n_{mit}, \quad n_{mit} = \begin{cases} 1 & \text{if } p_{mit} q_{mit} > 0 \\ 0 & \text{otherwise} \end{cases} \quad (1)$$

I_{mt} is the set of the products for which bilateral export data between Austria and destination country m are available in period t .⁷ In addition, we will also compute Austria's multilateral extensive margin (EM_{mt}^I) to each of the five following destination regions r : 1) euro-15 (Intra-euro), 2) non-euro area countries (Extra-euro), 3) EU-26 countries (Intra-EU), 4) non-EU countries (Extra-EU), and 5) world (World). It is obtained accordingly, using partner regions r instead of individual partner countries m in definition (1).

Underlying equation (1) is a static concept, depicting the level of the extensive margin at a given point in time. Taking a dynamic perspective, the extensive margin $g_{EM_m^I}$ refers to the compound annual growth rate (CAGR) of number of product categories i exported by Austria to destination country m (or regions r) between years t and $t+1$, i.e.,

$$g_{EM_m^I} = \left(\frac{EM_{mt+1}^I}{EM_{mt}^I} \right)^{\left(\frac{1}{T}\right)} - 1 \quad (2)$$

where T is the number of years in the period being considered.

In contrast, the bilateral intensive margin (IM_{mt}^I) is defined as the export value of 'common' products that were exported by Austria to country m in both periods, period t and period $t + 1$, i.e.,

$$IM_{mt}^I = \sum_{i \in I_{mc}} p_{mit} q_{mit} \quad (3)$$

where $I_{mc} = (I_{mt} \cap I_{mt+1})$ represents the set of products that were exported to country m in both periods. Hence, the intensive margin is the value of 'common' products being exported to 'old' destinations.

Taking a dynamic perspective, the growth of intensive margin ($g_{IM_m^I}$) is given by

$$g_{IM_m^I} = \sum_{i \in I_{mc}} s_{mit+1}^I \left(g_{P_{mi}^I} + g_{Q_{mi}^I} \right) \quad (4)$$

⁷ In the present paper, we use the CEPII's BACI database which contains trade data for 5111 product categories at the six digit level of the Harmonized System. See the data description below.

where $g_{p_{jmi}^I} = \left(\frac{p_{jmit+1}}{p_{jmit}}\right)^{\left(\frac{1}{T}\right)} - 1$ and $g_{q_{jmi}^I} = \left(\frac{q_{jmit+1}}{q_{jmit}}\right)^{\left(\frac{1}{T}\right)} - 1$ represent the price and quantity growth of exports of product i to destination country m , and $s_{mit+1}^I = \frac{p_{mit+1}q_{it+1}}{\sum_{i \in I_{mt+1}} p_{mit+1}q_{mit+1}}$ gives the export value shares of product category i in Austria's total exports to country m in period $t + 1$, with $\sum_{i \in I_{mt+1}} s_{mit+1}^I = 1$.

Hence, in equation (4) growth of intensive margin is decomposed into two parts: growth of price margin and growth of quantity margin. Thus, the overall growth rate of the bilateral intensive margin can be seen as export value share-weighted average of the growth rates of the price and quantity margins of all product categories exported to country m between the two periods. The growth rates of the multilateral price margin and quantity margin can then be calculated as export value share-weighted average of the growth rates of the bilateral margins. Furthermore, the same calculations are also carried out for the intermediate and final goods to see whether their growth rates are quite different. Obviously, the growth rates of the extensive and intensive margin do not add up to the overall growth rate of the value of exports, given that the extensive margin is calculated by assigning the same weight to each product category.

3.2 Decomposition method of export shares

An alternative to the export value-based count approach to decompose bilateral exports into the extensive and intensive margins has been devised by Hummels and Klenow (2005). Their method is a cross-country analogue to Feenstra's (1994) approach to incorporate new varieties into a country's import price index. Using q_{mit} to denote the quantity of exports and p_{mit} to denote the price (unit values), the bilateral extensive margin of Austria's exports to country m in period t is defined by

$$EM_{mt}^{II} = \frac{\sum_{i \in I_{mt}} p_{kmit} q_{kmit}}{\sum_{i \in I_t} p_{kmit} q_{kmit}} \quad (5)$$

where I_{mt} is the set of observable categories in which Austria has positive exports to country m in period t . As a reference country, we use the rest of the world (k) throughout, such that I_t denotes all categories imported by the destination country m in period t . Hence, the extensive margin can be interpreted as refined measure of the fraction of categories in which Austria exports to country m , where each category is weighted by the importance of rest-of-world exports to destination country m , or, equivalently, by the importance of country m 's imports from the rest of the world. EM_{mt}^{II} is positive and can take values between 0 and below 1.

The bilateral intensive margin, on the other hand, is defined as Austria's nominal exports to country m , relative to exports from the rest of the world, summing over those categories in which Austria exports to country m , (I_{mt}):

$$IM_{jmt}^{II} = \frac{\sum_{i \in I_{mt}} p_{mit} q_{mit}}{\sum_{i \in I_{mt}} p_{kmit} q_{kmit}} \quad (6)$$

Hence, the bilateral intensive margin calculates Austria's export share in the rest-of-world exports to country m in those products in which Austria exports to country m . IM_{mt}^{II} also can take values between 0 and 1. Note that the extensive margin will be large if Austria exports many different products i to country m , while the intensive margin will be large if Austria exports large amounts of a few categories i to m .

Following Hummels and Klenow (2005), we further decompose the bilateral intensive margin into a price (quality) and quantity component as follows:

$$IM_{mt}^{II} = P_{mt}^{II} \times Q_{mt}^{II} \quad (7)$$

where Q_{mt} is the implicit quantity index and P_{mt} is the price index. As in Hummels and Klenow (2005), we construct a bilateral aggregate price index based on the contribution of Feenstra (1994). This price index is given by:

$$P_{mt}^{II} = \prod_{i \in I_{mt}} \left(\frac{p_{mit}}{p_{kmit}} \right)^{w_{mit}^{II}} \quad (8)$$

where w_{mit}^{II} is the logarithmic mean of w_{mit}^{II} (the share of category i in Austria's exports to country m) and s_{kmit} (the share of category i in world (k) exports to country m):

$$s_{mit}^{II} = \frac{p_{mit}q_{mit}}{\sum_{i \in I_{mt}} p_{mit}q_{mit}} \quad (9a)$$

$$s_{kmit}^{II} = \frac{p_{kmit}q_{kmit}}{\sum_{i \in I_{mt}} p_{kmit}q_{kmit}} \quad (9b)$$

$$w_{mit}^{II} = \frac{\frac{s_{mit} - s_{kmit}}{\ln s_{mit} - \ln s_{kmit}}}{\sum_{i \in I_{mt}} \frac{s_{mit} - s_{kmit}}{\ln s_{mit} - \ln s_{kmit}}} \quad (9c)$$

On the other hand, the implicit quantity index, Q_{mt}^{II} , can be simply obtained by dividing the bilateral intensive margin over the price index. It should be added, however, that the decomposition into a price and quantity index relies on stronger assumptions than the one into extensive and intensive margin, namely that quality and within-category variety vary across categories i for each destination country m .

Note that the multiplication of the extensive and the intensive margin gives the bilateral overall market share of Austria's exports relative to rest-of-world exports to country m :

$$OV_{mt}^{II} = EM_{mt}^{II} \times IM_{mt}^{II} \quad (10)$$

Using equations (5) to (10) allows computing the overall share of bilateral exports, bilateral extensive margins, bilateral intensive margins, and the bilateral price and quantity components (margins) for Austria's exports. The calculations for final goods and intermediate goods are carried out in the same manner.

Finally, as a multilateral measure of Austria's export margins and components for each region r , we calculate weighted averages of the multilateral (extensive and intensive) margins and the multilateral (price and quantity) components over the set of destination countries belonging the same region r for period t .⁸

These measures are static measures, decomposing Austria's bilateral exports into the extensive and intensive margin at a point in time. To get an idea of the growth of export shares of Austria over time, we also calculate annual growth rates of export shares of Austria between 1998 and 2011. To do so, we first compute the bilateral extensive margin, the intensive margin and the price and quantity components for each destination country in 1998 and 2011 and then obtain the compound annual growth rates of each margin using a method similar to one given in the equation (2). This exercise is also carried out at the regional level to compute the compound annual growth rates of multilateral margins. Notice that the growth rate of the overall margin and that of export values are not exactly the same since the rest-of-the world is the reference rather than the whole world and since there is time variation in the rest-of-world exports to country m .⁹

3.3 Decomposition method of export growth rates

Third method we employ in this paper is based on the method developed first by Amiti and Freund (2008) and further extended by Bingzhan (2011). It enables us to accurately calculate the contribution of each margin to Austria's export growth and to decompose Austria's export growth relative to the base period into two parts: (i) the growth in value of the products that were exported in both periods (intensive margin), and (ii) the growth in export due to the

⁸ Note that at the country and regional level, the intensive margin may not equal to the product of the price and quantity components due to rounding (See Table 4a-c).

⁹ Hence, if the size of the destination market m grows (in terms of rest of world exports) a constant market share (overall margin) is associated with positive growth of export to country m .

growth of variety or destination (extensive margin). To obtain the relative contribution of each margin, first define the ratio of bilateral exports shares in period t and period $t + 1$ as

$$ER_m^{III} = \frac{\sum_{i \in I_{mt+1}} x_{mit+1}}{\sum_{i \in I_{mt}} x_{mit}} \quad (11)$$

where x_{mit} and x_{mit+1} represent Austria's export values of product i to destination country m in period t and period $t + 1$, respectively, and I_{mt} and I_{mt+1} denotes the set of products in which Austria has positive exports to the destination country m in period t and period $t + 1$, respectively. The bilateral export ratio between the two time periods (ER_m^{III}) can be rewritten as product of extensive margins and intensive margins:

$$ER_m^{III} = EM_m^{III} \times IM_m^{III} = \left(\frac{\sum_{i \in I_{mt+1}} x_{mit+1}}{\sum_{i \in I_{mc}} x_{mit+1}} \bigg/ \frac{\sum_{i \in I_{mt}} x_{mit}}{\sum_{i \in I_{mc}} x_{mit}} \right) \times \frac{\sum_{i \in I_{mc}} x_{mit+1}}{\sum_{i \in I_{mc}} x_{mit}} \quad (12)$$

where $I_{mc} = (I_{mt} \cap I_{mt+1})$ again represents the set of products that were exported to country m in both periods. Export growth due an increase in variety or partners is (extensive margin, EM_m^{III}) is given by the expression in parenthesis; the second part of the equation reflects the contribution of the intensive margin (IM_m^{III}), i.e. the growth in the value of the common exported products.

In line with Hummels and Klenow (2005), Bingzhan et al. (2011) further decompose the bilateral intensive margin into the price margin and quantity margin as follows:

$$IM_m^{III} = \frac{\sum_{i \in I_{mc}} p_{mit+1} q_{mit+1}}{\sum_{i \in I_{mc}} p_{mit} q_{mit}} = \prod_{i \in I_{mc}} \left(\frac{p_{mit+1}}{p_{mit}} \right)^{w_{mi}^{III}} \prod_{i \in I_{mc}} \left(\frac{q_{mit+1}}{q_{mit}} \right)^{w_{mi}^{III}} \quad (13)$$

where w_{mi}^{III} is the logarithmic mean of s_{mit}^{III} (the share of category i in Austria's exports to country m in period t) and s_{mit+1}^{III} (the share of category i in Austria's exports to country m in period $t + 1$):

$$s_{mit}^{III} = \frac{p_{mit} q_{mit}}{\sum_{i \in I_{mc}} p_{mit} q_{mit}} \quad (14a)$$

$$s_{mit+1}^{III} = \frac{p_{mit+1} q_{mit+1}}{\sum_{i \in I_{mc}} p_{mit+1} q_{mit+1}} \quad (14b)$$

$$w_{jmi}^{III} = \frac{\frac{s_{mit+1} - s_{mit}}{\ln s_{mit+1} - \ln s_{mit}}}{\sum_{i \in I_{mc}} \frac{s_{mit+1} - s_{mit}}{\ln s_{mit+1} - \ln s_{mit}}} \quad (14c)$$

Hence, for each destination country m the export ratio between two time periods can be decomposed as

$$ER_m^{III} = \frac{\sum_{i \in I_{mt+1}} x_{mit+1}}{\sum_{i \in I_{mt}} x_{mit}} = EM_m^{III} \times P_m^{III} \times Q_m^{III} \quad (15a)$$

$$ER_m^{III} = \left(\frac{\sum_{i \in I_{mt+1}} x_{mit+1}}{\sum_{i \in I_{mc}} x_{mit+1}} / \frac{\sum_{i \in I_{mt}} x_{mit}}{\sum_{i \in I_{mc}} x_{mit}} \right) \times \prod_{i \in I_{mc}} \left(\frac{p_{mit+1}}{p_{mit}} \right)^{w_{jmi}^{III}} \prod_{i \in I_{mc}} \left(\frac{q_{mit+1}}{q_{mit}} \right)^{w_{jmi}^{III}} \quad (15b)$$

Take the log of both sides of the export ratio equation (15b) (and dividing the result by the total number of years between period t and period $t + 1$, i.e 13 years), we obtain a decomposition of the annual growth of exports with partner country m ($g_{ER_m^{III}}$) into the growth of the extensive margin ($g_{EM_m^{III}}$), and the price ($g_{P_m^{III}}$) and quantity component ($g_{Q_m^{III}}$):

$$g_{ER_m^{III}} = g_{EM_m^{III}} + g_{P_m^{III}} + g_{Q_m^{III}} \quad (16)$$

where $g_{ER_{jm}^{III}}$ is calculated as $g_{ER_{jm}^{III}} = 100 \times \ln(ER_{jm}^{III}) / \{(t + 1) - (t)\}$. Similar calculations are also carried out for $g_{EM_{jm}^{III}}$, $g_{P_{jm}^{III}}$, and $g_{Q_{jm}^{III}}$.

Finally, the contribution of each margin to the growth rate of the bilateral export ratio can be calculated as

$$r_{EM_m^{III}} = 100 \times (g_{EM_m^{III}} / g_{ER_m^{III}}) \quad (17a)$$

$$r_{P_m^{III}} = 100 \times (g_{P_m^{III}} / g_{ER_m^{III}}) \quad (17b)$$

$$r_{Q_m^{III}} = 100 \times (g_{Q_m^{III}} / g_{ER_m^{III}}) \quad (17c)$$

To calculate the contribution ratios and growth rates of each margin with a multilateral dimension, we first obtain the data for each region by aggregating the data of each member country and then computing export margins for each destination region r .

Summing up, three different methodologies will be used to decompose Austrian export values (shares, growth) into the extensive and the intensive margins (including both bilateral dimension and multilateral dimension), the latter one is further decomposed into price and quantity margins. All calculations will be carried out for total trade and for the subgroups of final goods and intermediate goods trade. Before turning to the results, we present more detailed information about Austrian export data and the categorization into final and intermediate goods trade.

IV. Data

In the decomposing of Austria's export growth along the extensive and intensive margins, we have used the BACI international trade database from the CEPII, which contains data for 245 countries and 5,066 product categories classified according to the Harmonized System (HS, 1996) at the 6-digit level.¹⁰ Data availability in the BACI HS 1996 database spans from 1998 to 2011. This database, constructed using the United Nations Commodity Trade Statistics original database (UN COMTRADE), provides detailed annual bilateral trade data for commodity exports in value (in thousands of US Dollars at the current prices) and quantities at the 6-digit level of the HS 1996, which allows us to calculate unit values for each product or item. As compared to the original database, working with the BACI database has several advantages. First, the BACI database reconciles mirror flows (for both values and quantities) reported at least by one of the partners, thus providing a more complete and refined

¹⁰ The BACI database is available for researchers already subscribing to the United Nations COMTRADE database at: http://www.cepii.fr/CEPII/en/bdd_modele/presentation.asp?id=1.

geographical coverage. Second, compared to the UN COMTRADE database (quantities are reported in different units of measure, such as meters, square meters, number of items, kilograms, liters, etc.), quantities in the BACI database are registered in the same unit (tons) so that unit values are comparable at the world and product level.¹¹ Therefore, the BACI database is particularly convenient to decompose the Austria's export growth into margins. It would be ideal to use intra-firm trade statistics to measure the growth in export margins. Unfortunately, these data are not available at the detail needed. Thus, we use data on exports of Austria to 215 importing countries over the period 1998 to 2011, comprising 5066 items at the Harmonized System's (HS, Revision 1996) 6-digit level (For a list of countries and information about each region, see Table A1).¹²

To distinguish intermediate goods from final goods, we use the United Nations Broad Economic Categories (BEC) classification scheme as in Hummels et al. (2001). As shown in Table A2, the BEC includes 19 basic categories, which are classified as capital goods (categories 41 and 521), consumption goods (categories 112,122, 522, and 6), intermediate goods (categories 111,121, 2, 31, 322, 42, and 53), and not classified (categories 321, 51 and 7). Categories, 321 (motor spirit) and 51 (passenger motor cars) could be consumed directly by consumers or used as intermediates; category 7 includes, among others, a range of military equipment, postal packages and special transactions and commodities not classified according to end-use classes. To address this issue, category 321, category 51, and category 7 are excluded from the calculations of the export margins for final goods and intermediate goods. In order to select the final and intermediate goods from the trade data, the correspondence table by the United Nations Statistics Division is used to map the HS-6 (1996) codes to the BEC codes (<http://unstats.un.org/unsd/default.htm>). As a consequence, about 1238 items are

¹¹ A detailed description of the BACI database can be given by Gaulier and Zignago (2010).

¹² Many small or island countries are not included in the calculations, often due to absence of trade or unreliable data. In addition, in the BACI database, Belgium and Luxembourg are a single entity.

considered as final goods and 3177 items are considered as intermediate goods out of 5066 items from the 6-digit level of the HS.

V. Overview of the export values of Austria

Before presenting the results of the export margins, we start by providing an overview of Austria's exports to the selected destination countries and regions over the period 1998 to 2011, differentiated by product categories where we distinguish between total goods, final goods and intermediate goods. The main focus is on differences across destination countries and regions, differences across different product categories and changes over time. The selected countries given in tables were chosen based on their importance in the value of Austria's total exports in 2011 and also availability of the export data. Furthermore, as defined above, Austria's total, final and intermediate exports are decomposed into five destination regions r : Intra-euro, Extra-euro, Intra-EU, Extra-EU, and world.

Total exports by destination countries and regions

Values and growth rates of Austria's total goods exports to the 25 destination countries and 5 destination regions are reported in Table 1 for the period 1998-2011. The geographical composition of Austria's total goods exports reveals several important empirical facts. First, as seen in Table 1, Austria's total goods exports have experienced high growth rates since 1998, which is well above than the many of the European Union countries. Austria's total goods exports has more than doubled from 56,5 billion U.S. dollars in 1997 to 137.5 billion U.S. dollars in 2011, rising at an average annual (compound) rate of 7.08 percent per year. However, the increase in Austria's Extra-euro and extra-EU exports was more pronounced. It seems that Austria's total goods exports with countries outside of the EU (both Extra-euro and Extra-EU) has developed somewhat more dynamically than trade with EU countries: Between 1998 and 2011, Austria's exports to the Extra-euro and Extra-EU regions rose by 8.34

percent and 9.19 per cent, respectively, per year, surpassing the average export growth rate of Austria's exports to the world (7.08 percent).

Second, the results indicate that export growth rates vary enormously across destination countries during the study period. As shown in Table 1, Germany remained Austria's largest export trading partner. Compared with the base year 1998, total goods exports to Germany increased from 18.3 billion U.S. dollars in 1998 to 40.7 billion U.S. dollars in 2011, or at a 6.3 percent growth rate per year. The other top three destination countries of Austria in 2011 were Italy (9.9 billion U.S. dollars in 2011) and Switzerland (7.4 billion U.S. dollars in 2011). It is also evident from Table 1 that over the last few years Austria has successfully increased its exports to Eastern European markets. The EU accession of Romania (16.22), Poland (10.86), Slovakia (9.22), and Slovenia (7.87) coupled with geographic proximity enabled Austria to increase its exports by more than the world average export growth rate of 7.08 percent. Although there is still a high export concentration on the core EU markets, it seems that the share of the core EU countries appears to have gradually fallen over time.¹³ This is likely due to the fact that these countries already had a high degree of integration with Austria, leading to low export growth rates over the last decade.

Final goods exports by destination countries and regions

We also compute the value and growth rates of Austria's final goods exports by destination region as well as by destination countries. All these calculations are also reported in Table 1.

The results revealed several interesting facts about how the final goods exports change over the sample period. First of all, maybe the most important fact to highlight is that the growth

¹³ As shown in Bhattacharya (2007), Austria's trade links with Central and Eastern Europe have gathered momentum in recent years. In particular, Central and Eastern European countries' share of Austria's total exports rose from 12.5 % in 1991-1995 to 18 % in 2001-2005 while its share in total exports increased from 8 % in 1991-1995 to 14 % in 2001-2005.

rate of final goods exports is more than those of intermediate goods exports. As seen in Table 1, the overall growth rate of final goods exports is 8.13 percent while that of intermediate goods exports is 6.49 percent.¹⁴ At a regional level, not surprisingly, the value of Austria's final goods exports to outside the euro area and the EU has been increasing more than that of within the euro and/ or the EU over the period that we consider. In particular, the annual compound percentage change in the value of Austria's final goods exports outside the euro area (Extra-Euro) and EU (Extra-EU) over the study period have grown at 10.16 and 11.50 percent, respectively, well above Austria's overall average of 8.13 percent. Specifically, most of Austria's final goods exports growth between 1998 and 2011 occurred with non-EU countries, particularly East Asian countries. Among them, Austria's final goods exports to Brazil (22.61 percent), India (22.10 percent), South Korea (22.01 percent), China (16.37 percent) and Russia (15.68 percent) have seen the strongest growth.

Intermediate goods exports by destination countries and regions

As seen in Table 1, Austria also experienced an annual growth rate of intermediate goods exports of 6.49 percent from 1998 to 2011, but their export growth rates still lag behind those of final goods exports (8.13 percent). At regional level, Austria's intermediate goods exports to the outside of the EU (Extra-EU) expanded extraordinary degree from 8.01 billion U.S. dollars to 21.2 billion U.S. dollars in 2011 at a annual compound rate of 7.81 percent. Also worth mentioning that there are clearly high growth rates of intermediate goods exports to the new member states of the EU, which rose considerably above Austria's overall average of 6.49 percent (Romania 16.91 percent, Poland 11.51 percent, Slovakia 8.25 percent, and Slovenia 7.20 percent). High growth rates as compared to the base year could be also seen in

¹⁴ Similarly, in a recent study Türkcan (2011) shows that the export shares of motor vehicle products (final goods) in total automotive exports of Austria has increased from 35% in 1996 to 45% in 2006 whereas the export share of auto-parts in total exports has fallen steadily from 65% to 55% during the sample period.

intermediate goods exports to India (20.05 percent), China (18.25 percent), Russia (12.95 percent), South Korea (12.53 percent) and Brazil (9.19 percent). High growth rates in intermediate goods to the new member states and East Asian countries suggest that Austrian firms are locating their production stages to take advantage of differences in labor costs across these countries in which wages are quite low.

VI. Extensive and intensive margins of Austria's exports

As has been said before, there have been various methods developed to decompose the growth of exports into extensive and intensive margins, and the latter further into price and quantity margins. In this paper, we have employed three methods- the count method, decomposition method of export shares developed by Hummels and Klenow (2005) and decomposition method of export growth rates developed by Bingzhan (2011)- to analyze Austria's export growth over the period 1998-2011. In addition, we employ these methods for different categories of goods (total goods exports, final goods exports, and intermediate goods exports).

6.1 The results of the count method

Extensive and Intensive Margins of Austria's Total Goods Exports

The main results of the count method for each product groupings are presented in Table 2 and 3 at both regional level and country level. The left panel of Table 2 shows the result of the extensive margin growth of Austria's exports while the left panel of Table 3 provides price and quantity growth in Austria's exports over the sample period. As seen in Table 2, the first and second column of the left panel shows the number of products that Austria exports to each destination country in 1998 and 2011, respectively. The left panel of Table 2 also reports the number of country-product relationships that Austria has for each destination region. The third column of Table 2 gives the growth at the extensive margin between Austria and its

destination country or region using the equation (2). As seen, the number of country-product relationships that Austria has with the world increased from 107.8 thousand in 1998 to 111.9 thousand in 2011, an annual average growth rate of 0.29 percent. As we shall see later, the growth rates of extensive margin are generally higher for Extra-euro and Extra-EU countries compared to the Intra-euro and Intra-EU countries, with particularly large increases found for the Extra-EU (an increase from 54.2 thousand country-product relationships in 1998 to 62.1 thousand country-product relationships in 2011, indicating an annual growth rate of 1.06 percent over the period). Austria has achieved very high extensive margin growth rates with India (3.85 percent), China (3.65 percent), Romania (1.48 percent), South Korea (0.51 percent) and Brazil (0.39 percent). The results suggest that Austria's non-traditional exports markets tend to become more important than the traditional markets as it successfully creates new products and/or new markets during the past decade. Another explanation is that Austria have already established nearly all country-product relationships and hence there is no room for expansion along the extensive margin (in terms of new markets or products).

Utilizing the export dataset that includes only observations that are present in both periods (1998 and 2011), we also apply the count method to compute the price and quantity growth rate of Austria's total goods exports by destination regions and countries for the period 1998 to 2011. As noted above, the growth in the intensive margin is itself given by the weighted average of the growth rates of the price and quantity margins. This procedure allows us to assess whether Austria's export growth is the result of higher prices or higher quantities. All these results (the results for the growth rates of the intensive margin are not shown to save space), by destination region and countries, are reported in Table 3. The first striking fact is that the overall growth rate of quantity component for total goods (21.11 percent) is much more important than that of price (2.58 percent). It seems that the relative importance of the

quantity component increases as we move to Extra-euro (27.84 percent) and Extra-EU regions (31.82 percent). Additionally, the growth rates of the price and quantity components varies among trading partners. In particular, the countries outside the EU, with the exception of Slovenia, such as have higher growth rates of quantity than the rest of the countries. As it can be observed in Table 3, the growth rates of quantity component over the period are found to be highest in Slovenia (75.34 percent). Other destination countries with relatively high average annual growth rates of the quantity component over the period of 1998-2011 include China at 56.50 percent, Croatia at 55.04 percent, Sweden at 46.45 percent and China at 45.84 percent.

We turn to the growth rates of the price margin for total goods in Table 3. Compared to the growth rate of quantity margin for the World, the growth rate of price margins in total goods over the past decade has been quite moderate at 2.58 percent. Thus, for Austria's total goods exports, the results indicate that changes in the intensive margins are mostly driven by the quantity changes rather price changes. The results at the regional level show that Intra-euro and Intra-EU have experienced much larger growth rates, averaging around 2.76 percent and 3.41 percent growth rates of the price margin per year, respectively (as compared to the overall growth rate of 2.58 percent). As expected, we also found sizable differences in the growth rates of the price margins across destination countries. The destination countries with the highest growth rates are Poland (22.52 percent), France (10.72 percent), Belgium-Luxembourg (6.87 percent), Hungary (6.35 percent) and Japan (5.41 percent). In sum, our results show that the quantity growth rate has been the most important for Austria's total goods export growth over 1998-2011.

Extensive and Intensive Margins of Austria's Final Goods Exports

Using the count method, we also compute the growth rate of extensive margin of Austria's final goods exports over the period 1998-2011. The results are shown in the middle panel of Table 2 for each destination region and country. An inspection of middle panel of Table 2 reveals that the number of products that Austria exports to the world has increased from 24.3 thousand to 29.0 thousand during the study period, showing a 1.39 percent annual growth rate of the extensive margin. As evident in Table 2, the growth rate of the extensive margin tends to be higher in final goods (1.39 percent) compared to intermediate goods (-0.51 percent), suggesting that Austria tends to specialize more in the production of final goods during the past decade. Further, similar to the total goods, the growth rate of the extensive margin of final goods exports is much higher in countries the outside of the EU than the within the EU. Additionally, there are wide variations in the growth rates of extensive margins across destination countries. Table 2 indicates that the highest growth rate of extensive margin is seen for India (9.32 percent). China (6.27 percent), Romania (3.37 percent), South Korea (2.79 percent) and Brazil (2.73 percent) are other important export partners with a high extensive margin growth rates.

Turning to the growth rates of the price margin and quantity margin for Austria's final goods exports, we found that the price margin grew moderately between 1998 and 2011 for the world (4.07 percent) while the quantity margin increased significantly at 18.25 percent, as shown in the middle panel of Table 3. Thus, the results for final goods suggest that the growth of the intensive margins was mostly along the quantity margin, which are in line with the results of Austria's total goods exports. Furthermore, at the regional level, changes in the price margin are relatively larger for the Extra-Euro (4.50 percent) and Extra-EU (6.50) while these changes are slightly lower for the Intra-Euro (3.63 percent) and the Intra-EU (2.86 percent). Further, the growth rates of the price margin shows substantial differences across

countries, ranging from -25.40 percent to 21.33 percent. With the exception of India (19.83 percent) and China (16.77 percent), the growth rates of the price margin tends to be higher for developed countries, such as Canada (21.33 percent), France (18.40 percent), Belgium-Luxembourg (16.51 percent) and Switzerland (10.26 percent).

However, in comparison with the results of the price margin at the regional level, the growth rate of the quantity margin for the Extra-Euro (22.26 percent) and the Extra-EU (21.56 percent) exhibit large growth rates compared with the Intra-Euro (14.22 percent) and the Intra-EU (16.59 percent). For the growth rates of quantity margin, however, there was even wider variation across countries. Slovenia (75.51 percent), Sweden (47.86 percent), Croatia (46.16 percent), Brazil (45.08 percent) and Czech Republic (34.81 percent) reported among the highest growth rates of the quantity margin, while France (5.81 percent) and Germany (9.90 percent) reported relatively low growth rates.

Extensive and Intensive Margins of Austria's Intermediate Goods Exports

When examining the growth rate of extensive margin of Austria's intermediate goods exports to the world, we found that the extensive margin declined by -0.51 percent annually, from 62.4 thousand to 58.4 thousand, over the same period. As evident in right panel of Table 2, the overall growth rate of the extensive margins in intermediate goods is much lower than in final goods. Looking at the regional level and country level, the changes in the growth rates of the extensive margin in intermediate goods is found to be in stark contrast to that of final goods. Specifically, Austria has seen a sharp decline in intermediate goods exports to the Intra-Euro (-1.31 percent) and Intra-EU (1.22 percent). In addition, considerable differences in the growth rates of the extensive margin in intermediate goods can be observed across countries. Table 2 shows that China (3.21 percent) has the highest growth rate of the extensive

margin in intermediate goods, but there are other partner countries with rather high growth rates of the extensive margin, such as India (3.05 percent) and Romania (0.79 percent). It seems that the increasing globalization of production (i.e. international fragmentation of production activities) have induced more trade in intermediate goods between Austria and East Asian countries.

We now consider the growth rates of the price margin and quantity margin for Austria's intermediate goods exports. For the World, the results shown in the right panel of Table 3 reveals that the price margin grew by 1.55 percent yearly from 1998 to 2011 while the quantity margin grew by 22.75 percent. These results suggest that the intensive margin for intermediate goods exports is dominated by higher quantity rather than higher price, broadly consistent with the results of total goods and final goods. The results with respect to the regional level indicates that the growth rates of the price margin are larger for Intra-Euro (2.24 percent) and Intra-EU (3.11 percent) whereas those of quantity margin are larger for both Extra-Euro (31.74 percent) and Extra-EU (38.79 percent). This pattern again underlines the fact that the recent growth in Austria's exports to the relatively advanced countries was mainly driven by the changes in the price margin whereas Austria's exports to the developing countries were primarily driven by the changes in the quantity margin. Furthermore, our results for the destination countries show that there was a significant variation across countries in the size of the increase in the price margin. For example, the highest growth rates of the price margin were found in Poland (26.72 percent), Slovakia (9.69 percent), Belgium-Luxembourg (6.18 percent), Hungary (6.03 percent) and Japan (5.78 percent). Turning to the growth rates of the quantity margin, Slovenia recorded the highest growth rates at 86.10 percent, followed by Canada (79.05 percent), Croatia (65.11 percent), Russia (52.14 percent) and Sweden (50.29 percent).

6.2 The results of the decomposition method of export shares

Following Hummels and Klenow (2005), for each destination region and country we also construct the extensive margin, the intensive margin, and the price and quantity components of the intensive margin, as defined in Section IV. As a new contribution, we further divide Austria's total goods exports into two product categories, such as final goods and intermediate goods, to examine the heterogeneity of the growth rates in each category. The results of the second method are reported in Tables 4a-4c, with the first two columns reporting estimates for each margin and the final third column reporting the growth rates for each margin.

Extensive and Intensive Margins of Austria's Total Goods Exports

For each destination region and country, Table 4a presents the estimates of the extensive margin, the intensive margin, and the price and quantity components of the intensive margin as well as their growth rates between 1998 and 2011.¹⁵ Austria has experienced a significant decline in the extensive margin of exports to the World between the beginning and the end of our sample, with an average growth rate of -1.50 percent. The intensive margin to the World (-0.54 percent) also fell, but by a much lower rate than the extensive margin. Furthermore, the decline in the intensive margin for the world is mainly driven by a reduction in the price component (-2.66 percent fell in the price component compared to 2.17 percent growth for the quantity component).¹⁶ In addition, as compared to the growth rates of the extensive margin,

¹⁵ Using 1995 trade data, Hummels and Klenow (2005) found that the weighted average shares of the extensive and intensive margins as well as of the price and quantity components for Austria's total goods exports to the world is 0.5004, 0.0286, 1.36 and 0.0209, respectively (See Table A1 in Hummels and Klenow, 2005).

¹⁶ In contrast, using EU COMEXT trade database at CN 8-digit level over the period 1999-2008, Stehrer et al. (2011) applied the decomposition methodology of Hummels and Klenow (2004) and found that the extensive margin of Austria's exports tend to grow more than the intensive margin. The shares of the extensive margin for Austria's exports to the world are 0.651 in 1999 and 0.682 in 2007 while that of the intensive margin is 0.046 and 0.047. Decomposing the intensive margin further into price and quantity components indicates that Austria tend to export at relatively lower prices which might be consistent with lower quality. The price index drops from 1.238 in 1999 to 1.081 while the quantity index increases from 0.037 to 0.044, consistent with our results (See Table 3.3.3 in Stehrer et al., 2011).

the growth rates of the intensive margin are positive for the Intra-Euro (0.71 percent) and Intra-EU (0.57 percent) countries over the period studied and the changes in the intensive margins are further mostly dominated by the changes in the quantity component, which confirms the empirical evidence that a deeper integration within the EU and euro area has induced some firms to specialize and produce more, but in a fewer product lines (See Badinger and Türkcan, 2013).

Extensive and Intensive Margins of Austria's Final Goods Exports

Variations in the extensive margins and the intensive margins of Austria's final goods exports across destination regions and countries from the year of 1998 to 2011 are shown in Table 4b. The picture for Austria's final goods exports to the World is clearly different from the results of the total goods exports. As seen in Table 4b, we have found a modest growth in Austria-World intensive margin (0.80 percent), while the extensive margin experienced a -0.52 percent decline during the same time period. Additionally, the results suggest that the intensive margin is dominated by higher quantity rather than by higher prices. The price component recorded a decline of -2.47 percent annually, while the quantity component increased 3.37 percent over the period. As expected, Extra-Euro and Extra-EU destination regions grew faster in intensive margin than other destination regions. Finally, the growth rates of intensive margin, particularly quantity component, are significantly larger compare with total goods exports.

Extensive and Intensive Margins of Austria's Intermediate Goods Exports

The average value and growth rates of the extensive margins and intensive margins as well as of the price and quantity components, measured across all destination regions and countries, for Austria's intermediate goods exports over the period 1998 and 2011 are given in Table 4c.

An inspection of Table 4c reveals that the growth rates of both the extensive margin and intensive margin have dropped during the period, -2.82 percent and -0.28 percent respectively, although this decline is more pronounced in the case of the extensive margin.

In addition, it seems that growth in the quantity component matters the most for Austria's intermediate goods exports. The growth rate of the quantity component for Austria-the world trade is relatively large: the quantity margin grew at 4.00 percent per year in 1998-2011 as compared to the growth rate of the price margin of -4.12 percent. When we analyze the evaluation of the export margins by destination regions, we also found that for intensive margins, particularly the quantity margin, the Intra-Euro and Intra-EU countries have a higher grow rates than the other regions, again confirming the anecdotal evidence mentioned above.

6.3 The results of the decomposition method of export growth rates

Finally, the last method used in our investigation involves the application of the Bingzhan method to compute the relative contributions of each export margin to Austria's export growth over the period 1998-2011. As mentioned above, the unique advantage of this method is that it permits the researcher to be able to precisely estimate the relative contributions of each margin to the country's export growth. The results of export margins obtained by the third method for each product category across destination regions and countries are given in Table 5a-5c. The first four columns displays the estimates for the export ratio, the extensive margin, the price margin and quantity margin, respectively while the next four columns give the calculated growth rates of the total export, the extensive margin, the price margin and quantity margin over the period 1998-2011. The last four columns, on the other hand, provide the relative contributions of the extensive margin, the price margin and the quantity margin to the Austria's export growth, respectively.

Extensive and Intensive Margins of Austria's Total Goods Exports

The results for Austria's total goods exports can be found in Table 5a. Looking at Austria's total goods exports to the world, we found that the annual (compound) growth rates of the export, the extensive margin, the price component, and the quantity component between 1998 and 2011 were 6.84 percent, -0.10 percent, 2.53 percent, and 4.41 percent, respectively. The results thus point out that the changes in the intensive margin, particularly the quantity component, outweighed changes in the extensive margin.¹⁷ Likewise, for all destination regions, the growth of Austria's total goods exports comes mainly from the growth in the intensive margin, especially from the quantity component, rather than the growth in the extensive margin. This finding supports the notion that quality upgrading is not a key element in Austria's recent export growth.¹⁸

Considering the export margins at the country level one can observe that the growth in Austria's export is mainly explained by the growth in intensive margin for all 25 countries.

Moreover, for 20 out of the 25 countries, the contribution of the quantity margin is relatively larger than those of the price margins while for five out of the 25 countries, including France, Hungary, Japan, Netherlands and Poland, the contribution of the price margin is greater than that of the quantity margin. Overall, the findings from the third method indicate that the

¹⁷ Similarly, using six digits bilateral export data obtained from the COMTRADE database, Di Nino (2009) found that overall increase in Austria's exports between 1999 and 2006 is mainly originated from the intensive margin rather than the extensive margin (See Table 4.1 in Di Nino, 2009). Furthermore, Zahler (2007) decompose the growth of more than 170 countries' exports between 1984 and 2000 into the contribution of the extensive margin and the intensive margin and found that Austria's export growth rate is 482 percent, and the intensive margin accounts for about 74.7 percent of Austria's export growth while the extensive margin accounts only 25.3 percent (See Table A2.2 in Zahler, 2007). Moreover, using Austrian firm level data for the manufacturing sector for the period 1997-2006, Pöschl et al. (2009) found that the firm intensive margin, i.e. the value of exports per exporting firms, is more important in explaining aggregate exports than the firm extensive margin, i.e. the number of exporters.

¹⁸ The Austria's External Economic Relationships 2007, published by FIW Research Centre International Economics, show that Austrian export specialization as measured by RCA values indicates a clear trend towards increased specialization in goods which require higher innovation and human capital intensities. However, the report also suggests that the relative market share of technology-oriented goods is growing but still relatively weak and the strongest specialization is still achieved in traditional manufacturing (See Austria's External Economic Relations 2007, p 16-17).

increase in the value of Austria's total goods exports to its destinations countries over the period 1998-2011 has been mainly driven by the quantity margin.

Extensive and Intensive Margins of Austria's Final Goods Exports

Using equation (11 through 17), Table 5b provides the results of the various measures of the export margins for Austria's final goods exports to destination regions and countries over the period 1998-2011. As depicted in Table 5b, Austria's final goods exports to the world grew substantially at an average annual rate of 7.82 percent during this period, which is considerably higher than that of the total goods exports. Furthermore, the results for the world reveal that the price margin (3.40 percent per year) and the quantity margin (4.15 percent) grew faster than the extensive margin (0.27 percent). The results for the world also indicate that 53.07 percent of Austria's export growth comes from the growth in the quantity margin while 43.42 percent comes from the growth in the price margin. The extensive margin (3.51 percent), however, has played a negligible role in Austria's rapid growth of final goods exports. One possible explanation is that Austria have already established nearly all export relationships in final goods and thus had little room for gain. This pattern holds true across all destination regions as well.

Country-based estimates from the third method show that the quantity margin plays a more prominent role for 20 out of the 25 countries whereas only in five countries (Canada, France, Netherlands, Poland and USA) the price margin dominates export growth. Therefore, the results in Table 5b clarify that the extensive margin has little or no impact on Austria's final goods export growth, while the intensive margin, especially the quantity margin, has a large impact on export growth.

Extensive and Intensive Margins of Austria's Intermediate Goods Exports

Finally, the results from the third method for Austria's intermediate goods exports are depicted in Table 5c. Considering the results for the world, we first observe that Austria has experienced similarly high growth rates in intermediate goods exports, with an average annual growth rate of 6.29 percent from 1998 to 2011. In addition, for Austria's intermediate goods exports to the world we find a negative growth rate of the extensive margin (-0.17 percent). In contrast, Austria has experienced positive growth rates of the price margin and the quantity margin of 2.51 and 3.95 percent, respectively. As seen in Table 5c, the growth in Austria's intermediate goods export was driven by the quantity margin (62.81 percent) while the price margin contributes only 39.95 percent of the export growth between two periods, relatively consistent with the results of the final goods exports. The results further point out that the contribution of the quantity margin to Austria's intermediate goods exports to four specific destination regions is also larger than those of all other margins. Therefore, at the regional level, we can conclude that the quantity margin growth is the main source for Austria's intermediate goods export growth.

On closer examination at the country level, this evidence also appears very robust: in 22 out of 25 countries, Austria's export growth can be explained by the growth in the quantity margin while in 3 countries export growth is due to the growth in the price margin. Overall, the results for intermediate goods indicate that the quantity margin is an important force in the exports growth.

VII. Conclusions

Austria has experienced remarkable export growth, averaging 7.08 percent per year from 1998 to 2011, far higher than the EU average over the same period. Using data on Austria's

exports of total goods, final goods, and intermediate goods to 215 countries, this study decomposes this remarkable export growth into the extensive margin, the intensive margin, and the latter further into price and quantity component. In this paper, we adopt three methodologies, namely the count method, the decomposition method of export shares developed by Hummels and Klenow (2005) and the decomposition method of export growth rates proposed by Amiti and Freund (2008) and extended by Bingzhan (2011), in order to quantify the role of these three margins in Austria's export growth.

The results show that all three methods produced fairly similar results regarding the role of extensive and the intensive margins in Austria's export growth. First of all, the results for Austria-the world given by the all three methods imply that the extensive margin growth rates has been modestly declining over the period under consideration, with the exception of the relatively small increase in the case of the count method. Further, our results show that the growth rate of the intensive margin has significantly increased during the period, although the Hummels and Klenow's method indicated the opposite for the total goods exports and intermediate goods exports. Moreover, regarding the price and quantity component of the intensive margin, the quantity component was higher than the price component across all three methods and product groups. Despite some differences, it seems fair to conclude that Austria's export growth is generally driven by the quantity margin.

The findings of the present study point out two structural weaknesses of Austrian foreign trade that need to be addressed effectively by the government. The first structural weakness in Austria's export structure arises from the fact that Austria's exports are still heavily concentrated in the traditional markets such as Germany, Italy, and Switzerland even though Austria's exports to the Extra-Euro and the Extra-EU regions have been on a steady growth

path over the past decade. Heavy concentration of exports in few markets can make Austria extremely vulnerable to external shocks. In order to reduce the instability of export earnings, Austria should diversify exports outside the traditional markets through utilization of the numerous export promotion tools and measures.

The second weakness is due to the fact the growth of Austria's exports is essentially driven by the intensive margin. The problem becomes much more severe in the case of Austria's intermediate goods exports where the export growth is mainly driven by the growth in quantity margin. As mentioned above, the extensive margin and intensive margin have very different welfare effects and policy implications. Export growth through the extensive margin provides benefits to producers because diversification can create new opportunities for learning and productivity growth which is essential for sustainable economic development. Diversification of export base also reduces instability in export earnings and expands export revenues. On the other hand, export growth through the intensive margin, particularly quantity component, results in a worsening of the terms of trade, which may adversely affect the living standards in Austria. In contrast, export growth through the price margin (assume that a high price means higher quality) may lead an improvement in quality which enhances Austria's competitiveness in the export markets and expand its export volume. In order to mitigate the adverse effects of the growth along the quantity margin on nation's welfare and achieve sustainable economic growth, Austria should implement the various policies and measures (such as promoting education and training, and R&D and innovation) to transform itself into a competitive industry that produces technologically sophisticated export products.

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Appendix

Table A1. List of countries

Afghanistan	Comoros	Vatican	Oman	Senegal
Albania	Congo	Honduras	Nauru	Seychelles
Algeria	Congo Dem. Rep.	Hong Kong	Nepal	Sierra Leone
American Samoa	Cook Islands	Hungary	Netherlands	India
Andorra	Costa Rica	Iceland	Neth. Antilles	Singapore
Angola	Croatia	Indonesia	Aruba	Slovakia
Antigua&Barbuda	Cuba	Iran	New Caledonia	Viet Nam
Azerbaijan	Cyprus	Iraq	Vanuatu	Slovenia
Argentina	Czech Rep.	Ireland	New Zealand	Somalia
Australia	Benin	Israel	Nicaragua	South Africa
Austria	Denmark	Italy	Niger	Zimbabwe
Bahamas	Dominica	Côte d'Ivoire	Nigeria	Spain
Bahrain	Dominican Rep.	Jamaica	Niue	Sudan
Bangladesh	Ecuador	Japan	Norfolk Isds	Suriname
Armenia	El Salvador	Kazakstan	Norway	Sweden
Barbados	Equatorial Guinea	Jordan	N.Mariana Isds	Switzerland
Belgium-Lux.	Ethiopia	Kenya	Micronesia	Syria
Bermuda	Eritrea	North Korea	Marshall Isds.	Tajikistan
Bhutan	Estonia	South Korea	Palau	Thailand
Bolivia	Falkland Islands	Kuwait	Pakistan	Togo
Bosnia&Herzegovina	S.Geo.&S.Sand. Isds.	Kyrgyzstan	Panama	Tokelau
Brazil	Fiji	Laos	Papua N.Guinea	Tonga
Belize	Finland	Lebanon	Paraguay	Trinidad&Tobago
Solomon Isds.	France	Latvia	Peru	U.A.E
Br. Virgin Isds.	French Polynesia	Liberia	Philippines	Tunisia
Brunei Darussalam	Djibouti	Libya	Pitcairn	Turkey
Bulgaria	Gabon	Lithuania	Poland	Turkmenistan
Myanmar	Georgia	Macau	Portugal	Turks&Cai. Isds.
Burundi	Gambia	Madagascar	Guinea-Bissau	Tuvalu
Belarus	State of Palestine	Malawi	East Timor	Uganda
Cambodia	Germany	Malaysia	Qatar	Ukraine
Cameroon	Ghana	Maldives	Romania	Egypt
Canada	Gibraltar	Mali	Russia	UK
Cape Verde	Kiribati	Malta	Rwanda	Tanzania
Cayman Isds.	Greece	Mauritania	Saint Helena	USA
Central Afr. Rep.	Greenland	Mauritius	Saint Kitts&Nevis	Burkina Faso
Sri Lanka	Grenada	Mexico	Anguilla	Uruguay
Chad	Guam	Taiwan	Saint Lucia	Uzbekistan
Chile	Guatemala	Mongolia	St. Pierre&Miq.	Venezuela
China	Guinea	Moldova	St. Vincent&Gre.	Wallis&Futuna
Christmas Isds.	Guyana	Montserrat	San Marino	Samoa
Cocos Isds.	Haiti	Morocco	Sao Tome&Principe	Yemen
Colombia	Heard Isds.&McD. Isds.	Mozambique	Saudi Arabia	Zambia

Notes: **European Union (EU-26):** France, Belgium, Luxembourg, Netherlands, Germany, Italy, UK, Ireland, Denmark, Greece, Portugal, Spain, Sweden, Finland, Malta, Estonia, Latvia, Lithuania, Poland, Czech Republic, Slovakia, Hungary, Slovenia, Cyprus, Romania and Bulgaria. **Euro Area (euro-15):** France, Netherlands, Germany, Italy, Ireland, Greece, Portugal, Spain, Belgium, Luxembourg, Finland, Slovenia, Slovakia, Malta, Cyprus and Estonia.

Table A2. The United Nations Broad Economic Categories classification scheme

Commodity categories	End-Use classes
1. Food categories	
11. Primary	
111. Mainly for industry	Intermediate goods
112. Mainly for household consumption	Consumption goods
12. Processed	
121. Mainly for industry	Intermediate goods
122. Mainly for household consumption	Consumption goods
2. Industrial supplies not elsewhere specified	
21. Primary	Intermediate goods
22. Processed	Intermediate goods
3. Fuels and lubricants	
31. Primary	Intermediate goods
32. Processed	Intermediate goods
321. Motor Spirit	Not classified
322. Other	Intermediate goods
4. Capital goods (except transport equipment), parts, and accessories thereof	
41. Capital goods (except transport equipment)	Capital goods
42. Parts and accessories	Intermediate goods
5. Transport equipment, parts and accessories thereof	
51. Passenger motor cars	Not classified
52. Other	
521. Industrial	Capital goods
522. Non-industrial	Consumption goods
53. Parts and accessories	Intermediate goods
6. Consumer goods not elsewhere specified	
61. Durable	Consumption goods
62. Semi-durable	Consumption goods
63 Non-durable	Consumption goods
7. Goods not elsewhere specified	Not classified

Table 1. The growth rate of Austria's exports by main destination countries, regions and product groups (in million U.S. dollars), 1998-2011.

Country	Total goods			Final goods			Intermediate goods		
	1998	2011	Growth rate	1998	2011	Growth rate	1998	2011	Growth rate
Belgium-Lux	1,054	2,791	7.78	128	529	11.56	757	1,872	7.21
Brazil	335	1,149	9.95	11	160	22.61	189	592	9.19
Canada	419	878	5.87	46	120	7.71	293	498	4.18
China	377	3,844	19.56	25	181	16.37	218	1,931	18.25
Croatia	598	939	3.52	154	176	1.03	318	612	5.16
Czech Rep.	1,810	4,107	6.51	195	549	8.27	1,165	2,409	5.75
France	2,519	5,431	6.09	538	837	3.45	1,457	3,139	6.08
Germany	18,347	40,720	6.32	2,838	6,419	6.48	12,057	27,064	6.42
Hungary	2,483	5,084	5.67	236	832	10.16	1,880	3,157	4.07
Italy	5,187	9,964	5.15	794	1,644	5.76	3,759	7,043	4.95
Japan	648	1,646	7.44	151	320	5.97	333	880	7.77
S. Korea	260	1,283	13.05	9	119	22.01	177	820	12.53
Netherlands	1,281	2,435	5.07	281	513	4.73	699	1,391	5.44
Poland	974	3,720	10.86	130	425	9.55	621	2,560	11.51
Romania	356	2,514	16.22	81	457	14.28	180	1,371	16.91
Russia	594	3,544	14.73	163	1,085	15.68	237	1,156	12.95
India	89	977	20.27	3	43	22.10	61	657	20.05
Slovakia	669	2,108	9.22	92	268	8.58	422	1,182	8.25
Slovenia	820	2,196	7.87	141	415	8.69	572	1,412	7.20
Spain	1,671	2,502	3.15	141	446	9.26	1,037	1,608	3.43
Sweden	963	1,568	3.82	112	216	5.20	693	1,030	3.10
Switzerland	3,273	7,430	6.51	731	2,741	10.70	1,920	2,972	3.42
Turkey	647	1,684	7.64	27	149	13.90	417	979	6.78
UK	2,457	4,412	4.61	619	1,096	4.49	1,240	2,196	4.49
USA	2,466	7,384	8.80	325	1,551	12.79	1,519	3,757	7.22
Intra-Euro	32,752	70,119	6.03	5,175	11,500	6.34	21,428	45,631	5.99
Extra-Euro	23,807	67,447	8.34	3,712	13,064	10.16	14,175	35,047	7.21
Intra-EU	42,561	93,657	6.25	6,719	15,645	6.72	27,590	59,380	6.07
Extra-EU	13,997	43,910	9.19	2,167	8,919	11.50	8,013	21,299	7.81
World	56,559	137,566	7.08	8,887	24,564	8.13	35,603	80,679	6.49

Notes: A formula similar to equation (2) was used to calculate the compound annual growth rates of Austria's exports to destination countries and regions. The sum of export values of final products and intermediate products is not equal to total exports since some BEC categories (321, 51, and 7) cannot be categorized into intermediate and final goods. *Source:* Authors' own calculations based on CEPII's BACI database at the 6-digit level of 1996 Harmonized System.

Table 2. The growth rate of Austria's extensive margin by main destination countries, regions and product groups, 1998-2011.

Country	Total goods			Final goods			Intermediate goods		
	EM_{jmt}^I	EM_{jmt+1}^I	$g_{EM_{jm}^I}$	EM_{jmt}^I	EM_{jmt+1}^I	$g_{EM_{jm}^I}$	EM_{jmt}^I	EM_{jmt+1}^I	$g_{EM_{jm}^I}$
Belgium-Lux	2,326	2,340	0.05	600	663	0.77	1,332	1,279	-0.31
Brazil	1,048	1,103	0.39	124	176	2.73	662	609	-0.64
Canada	1,373	1,121	-1.55	356	325	-0.70	752	514	-2.88
China	1,172	1,867	3.65	170	375	6.27	726	1,095	3.21
Croatia	2,943	2,534	-1.14	735	755	0.21	1,724	1,336	-1.94
Czech Rep.	3,613	2,984	-1.46	840	786	-0.51	2,194	1,701	-1.94
France	2,820	2,398	-1.24	674	644	-0.35	1,689	1,341	-1.76
Germany	4,178	3,746	-0.84	1,035	989	-0.35	2,528	2,167	-1.18
Hungary	3,705	3,023	-1.55	848	832	-0.15	2,269	1,716	-2.13
Italy	3,640	2,960	-1.58	953	826	-1.09	2,143	1,641	-2.03
Japan	1,675	1,409	-1.32	437	425	-0.21	932	696	-2.22
S. Korea	1,103	1,179	0.51	202	289	2.79	673	617	-0.67
Netherlands	2,445	2,287	-0.51	644	676	0.37	1,390	1,198	-1.14
Poland	2,495	2,538	0.13	599	696	1.16	1,437	1,393	-0.24
Romania	2,249	2,722	1.48	463	712	3.37	1,373	1,521	0.79
Russia	2,426	2,054	-1.27	704	583	-1.44	1,287	1,015	-1.81
India	937	1,531	3.85	70	223	9.32	658	973	3.05
Slovakia	3,067	2,710	-0.95	742	753	0.11	1,814	1,520	-1.35
Slovenia	3,507	2,919	-1.40	873	789	-0.78	2,093	1,669	-1.73
Spain	2,108	2,183	0.27	486	596	1.58	1,246	1,176	-0.44
Sweden	1,901	1,385	-2.41	487	414	-1.24	1,071	664	-3.61
Switzerland	3,545	2,879	-1.59	917	793	-1.11	2,050	1,545	-2.15
Turkey	1,915	1,920	0.02	341	428	1.76	1,162	1,081	-0.55
UK	2,399	2,198	-0.67	554	582	0.38	1,421	1,210	-1.23
USA	2,348	1,801	-2.02	560	473	-1.29	1,339	948	-2.62
Intra-Euro	31,658	29,095	-0.65	7,818	8,310	0.47	18,543	15,614	-1.31
Extra-Euro	76,159	82,872	0.65	16,494	20,780	1.79	43,956	42,881	-0.19
Intra-EU	53,598	49,782	-0.57	12,966	14,045	0.62	31,388	26,759	-1.22
Extra-EU	54,219	62,185	1.06	11,346	15,045	2.19	31,111	31,736	0.15
World	107,817	111,967	0.29	24,312	29,090	1.39	62,499	58,495	-0.51

Notes: The extensive margin (equation 1) refers to the number of products exported from Austria to each destination country or region. The growth rates of the bilateral and multilateral extensive margin were calculated with the help of equation (2).

Source: Authors' own calculations based on CEPII's BACI database at the 6-digit level of 1996 Harmonized System.

Table 3. Growth rates of the price and quantity margin in Austria's exports by main destination countries, regions and product groups, 1998-2011.

Country	Total goods		Final goods		Intermediate goods	
	$g_{P_{jmi}}^I$	$g_{Q_{jmi}}^I$	$g_{P_{jmi}}^I$	$g_{Q_{jmi}}^I$	$g_{P_{jmi}}^I$	$g_{Q_{jmi}}^I$
Belgium-Lux	6.87	27.31	16.51	14.33	6.18	30.56
Brazil	-0.73	36.10	-0.40	45.08	-3.20	42.28
Canada	-13.77	56.50	21.33	16.53	-29.12	79.05
China	3.23	45.84	16.77	22.69	-0.06	48.69
Croatia	-19.42	55.04	-17.55	46.16	-23.31	65.11
Czech Rep.	3.18	24.86	-3.82	34.81	-0.26	31.57
France	10.72	13.17	18.40	5.81	4.60	20.57
Germany	3.22	11.00	3.46	9.90	3.30	11.81
Hungary	6.35	12.36	5.05	18.03	6.03	11.11
Italy	1.57	15.24	1.07	15.17	1.65	14.75
Japan	5.41	15.22	6.34	21.96	5.78	12.81
S. Korea	2.68	30.62	2.66	29.52	2.31	32.86
Netherlands	5.30	11.75	5.57	11.25	5.54	11.09
Poland	22.52	10.35	6.65	17.22	26.72	9.44
Romania	0.74	33.58	2.45	29.18	-0.44	37.03
Russia	0.73	37.57	6.73	18.91	-5.22	52.14
India	4.32	27.94	19.83	20.63	5.65	26.11
Slovakia	5.21	26.42	6.23	23.96	9.69	27.36
Slovenia	-24.29	75.34	-25.40	75.51	-28.97	86.10
Spain	0.68	19.05	0.93	23.13	-0.36	19.48
Sweden	-7.44	46.45	-13.14	47.86	-7.55	50.29
Switzerland	-1.88	30.86	10.26	12.41	-12.76	48.43
Turkey	-8.36	42.83	3.37	32.12	-12.26	48.92
UK	3.90	15.65	1.90	10.91	4.70	15.47
USA	5.12	22.06	8.04	24.64	2.85	24.69
Intra-Euro	2.76	15.55	3.63	14.22	2.24	16.78
Extra-Euro	2.37	27.84	4.50	22.26	0.52	31.74
Intra-EU	3.41	16.96	2.86	16.59	3.11	17.95
Extra-EU	0.44	31.82	6.50	21.56	-3.66	38.79
World	2.58	21.11	4.07	18.25	1.55	22.75

Notes: The weighted annual growth rates of price and quantity margin of the common products were obtained with the help of equation (4), where the weights are the export value shares of the product categories in total exports of Austria to destination country/region in period 2011.

Source: Authors' own calculations based on CEPII's BACI database at the 6-digit level of 1996 Harmonized System.

Table 4a. Decomposition of Austria's export shares into extensive margin, price and quantity component by main destination countries and region, total goods trade, 1998-2011.

Country	EM_{jmt}^{II}	EM_{jmt+1}^{II}	$g_{EM_{jmt}^{II}}$	IM_{jmt}^{II}	IM_{jmt+1}^{II}	$g_{IM_{jmt}^{II}}$	P_{jmt}^{II}	P_{jmt+1}^{II}	$g_{P_{jmt}^{II}}$	Q_{jmt}^{II}	Q_{jmt+1}^{II}	$g_{Q_{jmt}^{II}}$
Belgium-Lux	0.7545	0.7081	-0.4870	0.0091	0.0088	-0.2597	5.2246	2.1208	-6.7003	0.0017	0.0041	6.9031
Brazil	0.4772	0.4944	0.2729	0.0115	0.0123	0.4860	2.0532	1.7855	-1.0690	0.0056	0.0069	1.5718
Canada	0.5806	0.5742	-0.0852	0.0049	0.0055	0.9384	5.7567	2.5615	-6.0390	0.0008	0.0021	7.4259
China	0.4921	0.4778	-0.2268	0.0064	0.0059	-0.6416	2.8058	1.9377	-2.8075	0.0023	0.0030	2.2285
Croatia	0.8518	0.7444	-1.0314	0.0862	0.0609	-2.6408	41.6205	1.2613	-23.5827	0.0021	0.0483	27.4046
Czech Rep.	0.8878	0.7468	-1.3216	0.0686	0.0390	-4.2540	7.0317	2.6980	-7.1036	0.0098	0.0145	3.0675
France	0.7985	0.7643	-0.3369	0.0112	0.0116	0.2838	1.9829	2.4127	1.5206	0.0057	0.0048	-1.2183
Germany	0.9633	0.8221	-1.2119	0.0437	0.0456	0.3125	1.3408	1.1521	-1.1596	0.0326	0.0395	1.4893
Hungary	0.9409	0.7632	-1.5974	0.1033	0.0721	-2.7294	1.0341	1.1054	0.5142	0.0999	0.0652	-3.2270
Italy	0.8728	0.6821	-1.8790	0.0288	0.0284	-0.0895	2.0006	1.1548	-4.1390	0.0144	0.0246	4.2244
Japan	0.5157	0.3332	-3.3037	0.0051	0.0065	1.8675	2.0251	2.2011	0.6432	0.0025	0.0030	1.2165
S. Korea	0.4308	0.3680	-1.2062	0.0074	0.0072	-0.1905	1.5966	1.3196	-1.4553	0.0046	0.0055	1.2834
Netherlands	0.7704	0.6597	-1.1870	0.0096	0.0068	-2.6228	1.6618	1.5166	-0.7007	0.0058	0.0045	-1.9356
Poland	0.7901	0.7664	-0.2347	0.0263	0.0238	-0.7740	1.2983	5.1949	11.2561	0.0203	0.0046	-10.8130
Romania	0.7754	0.7258	-0.5068	0.0399	0.0505	1.8369	3.9017	1.5877	-6.6824	0.0102	0.0318	9.1294
Russia	0.7659	0.7086	-0.5958	0.0154	0.0165	0.5541	6.6365	2.4276	-7.4444	0.0023	0.0068	8.6418
India	0.4025	0.4529	0.9113	0.0063	0.0055	-1.0281	1.9122	2.2551	1.2768	0.0033	0.0024	-2.2758
Slovakia	0.8219	0.7730	-0.4700	0.0613	0.0408	-3.0812	15.5664	5.6047	-7.5570	0.0039	0.0073	4.8416
Slovenia	0.9365	0.8496	-0.7465	0.0856	0.0893	0.3278	99.9770	1.1783	-28.9371	0.0009	0.0758	41.1816
Spain	0.7215	0.6527	-0.7678	0.0174	0.0118	-2.9097	1.9777	1.4212	-2.5094	0.0088	0.0083	-0.4106
Sweden	0.7482	0.5735	-2.0249	0.0199	0.0240	1.4316	3.7210	1.2519	-8.0380	0.0054	0.0192	10.2973
Switzerland	0.8789	0.7682	-1.0302	0.0452	0.0397	-0.9959	9.1928	1.5956	-12.6025	0.0049	0.0249	13.2803
Turkey	0.6169	0.6608	0.5302	0.0232	0.0124	-4.7253	17.0302	1.4971	-17.0587	0.0014	0.0083	14.8700
UK	0.7995	0.6842	-1.1903	0.0103	0.0106	0.2210	1.6728	1.6119	-0.2847	0.0061	0.0065	0.5071
USA	0.7775	0.6448	-1.4290	0.0041	0.0074	4.6968	2.4585	2.4576	-0.0026	0.0017	0.0030	4.6995
Intra-Euro	0.8859	0.8173	-0.6186	0.0460	0.0504	0.7156	2.0412	1.3608	-3.0706	0.0225	0.0371	3.9062
Extra-Euro	0.5562	0.4633	-1.3957	0.0174	0.0157	-0.8079	3.3105	2.4709	-2.2250	0.0053	0.0064	1.4494
Intra-EU	0.8744	0.7956	-0.7240	0.0351	0.0378	0.5777	2.1427	1.4967	-2.7224	0.0164	0.0253	3.3924
Extra-EU	0.4948	0.4205	-1.2424	0.0139	0.0128	-0.5807	3.6304	2.6505	-2.3910	0.0038	0.0048	1.8546
World	0.7079	0.5811	-1.5066	0.0166	0.0154	-0.5420	2.6186	1.8443	-2.6606	0.0063	0.0084	2.1764

Notes: For period t , EM_{jmt}^{II} represents the extensive margin (eq. 5), IM_{jmt}^{II} is the intensive margin (eq. 6), P_{jmt}^{II} is the price component (eq. 8), and Q_{jmt}^{II} is the quantity component (eq. 7). $g_{EM_{jmt}^{II}}$, $g_{IM_{jmt}^{II}}$, $g_{P_{jmt}^{II}}$, and $g_{Q_{jmt}^{II}}$ are the growth rates of the extensive margin, intensive margin, price component and quantity component. A formula similar to equation (2) was used to calculate the growth rates of each margin.

Source Authors' own calculations based on CEPII's BACI database at the 6-digit level of 1996 Harmonized System.

Table 4b. Decomposition of Austria's export shares into extensive margin, price and quantity component by main destination countries and region, final goods trade, 1998-2011.

Country	EM_{jmt}^{II}	EM_{jmt+1}^{II}	$g_{EM_{jm}^{II}}$	IM_{jmt}^{II}	IM_{jmt+1}^{II}	$g_{IM_{jm}^{II}}$	P_{jmt}^{II}	P_{jmt+1}^{II}	$g_{P_{jm}^{II}}$	Q_{jmt}^{II}	Q_{jmt+1}^{II}	$g_{Q_{jm}^{II}}$
Belgium-Lux	0.8103	0.8626	0.4824	0.0048	0.0069	2.8895	12.4875	3.0972	-10.1698	0.0004	0.0022	14.5377
Brazil	0.3461	0.3571	0.2417	0.0046	0.0251	14.0082	1.8612	2.4399	2.1042	0.0025	0.0103	11.6587
Canada	0.5287	0.6219	1.2565	0.0032	0.0031	-0.1478	5.2061	5.3749	0.2456	0.0006	0.0006	-0.3925
China	0.3510	0.5393	3.3597	0.0113	0.0060	-4.7894	4.8481	3.1297	-3.3106	0.0023	0.0019	-1.5294
Croatia	0.9115	0.8718	-0.3419	0.0867	0.0377	-6.2014	50.0372	1.3721	-24.1680	0.0017	0.0275	23.6926
Czech Rep.	0.9512	0.7871	-1.4457	0.0444	0.0321	-2.4510	8.5203	1.9877	-10.5921	0.0052	0.0162	9.1056
France	0.7869	0.7472	-0.3971	0.0107	0.0080	-2.2160	1.5543	2.6805	4.2812	0.0069	0.0030	-6.2304
Germany	0.9877	0.9229	-0.5208	0.0288	0.0324	0.8966	1.3382	1.1631	-1.0725	0.0215	0.0278	1.9905
Hungary	0.9660	0.8896	-0.6322	0.0685	0.0677	-0.0913	1.0206	1.1089	0.6406	0.0671	0.0610	-0.7272
Italy	0.9219	0.8517	-0.6073	0.0228	0.0190	-1.4061	1.6687	1.3876	-1.4088	0.0137	0.0137	0.0027
Japan	0.5911	0.6023	0.1446	0.0039	0.0036	-0.4862	2.0518	2.4739	1.4495	0.0019	0.0015	-1.9080
S.Korea	0.2924	0.4590	3.5276	0.0066	0.0073	0.8180	4.3015	1.8357	-6.3404	0.0015	0.0040	7.6430
Netherlands	0.8112	0.8048	-0.0608	0.0098	0.0066	-2.9505	1.8296	1.6765	-0.6699	0.0053	0.0040	-2.2960
Poland	0.8055	0.7726	-0.3200	0.0209	0.0154	-2.2946	1.3798	3.0367	6.2559	0.0151	0.0051	-8.0471
Romania	0.7995	0.8290	0.2786	0.0486	0.0457	-0.4773	7.0480	1.6260	-10.6688	0.0069	0.0281	11.4087
Russia	0.8698	0.7263	-1.3781	0.0109	0.0184	4.1283	5.0285	1.9894	-6.8843	0.0022	0.0092	11.8268
India	0.1578	0.6197	11.0977	0.0108	0.0046	-6.4190	2.4429	5.8361	6.9286	0.0044	0.0008	-12.4827
Slovakia	0.9137	0.8513	-0.5434	0.0529	0.0262	-5.2763	19.1652	7.1486	-7.3054	0.0028	0.0037	2.1891
Slovenia	0.9464	0.8413	-0.9017	0.0826	0.0879	0.4806	78.1394	1.0174	-28.3907	0.0011	0.0864	40.3177
Spain	0.6481	0.7710	1.3437	0.0086	0.0074	-1.1230	1.9290	1.4587	-2.1264	0.0045	0.0051	1.0252
Sweden	0.7479	0.6493	-1.0815	0.0118	0.0142	1.4265	12.9602	1.5003	-15.2838	0.0009	0.0095	19.7251
Switzerland	0.9706	0.7244	-2.2254	0.0393	0.0646	3.9078	12.9955	3.4297	-9.7396	0.0030	0.0188	15.1200
Turkey	0.6079	0.7070	1.1678	0.0126	0.0104	-1.4678	7.1499	1.4917	-11.3569	0.0018	0.0069	11.1561
UK	0.7666	0.7651	-0.0152	0.0123	0.0093	-2.1036	1.8568	1.9860	0.5189	0.0066	0.0047	-2.6090
USA	0.7853	0.7780	-0.0717	0.0023	0.0058	7.2271	2.9901	2.5869	-1.1081	0.0008	0.0022	8.4285
Intra-Euro	0.8772	0.8364	-0.3656	0.0339	0.0356	0.3668	1.8761	1.4043	-2.2032	0.0181	0.0253	2.6278
Extra-Euro	0.5965	0.5762	-0.2656	0.0129	0.0168	2.0415	3.9929	2.9201	-2.3782	0.0032	0.0058	4.5273
Intra-EU	0.8535	0.8110	-0.3921	0.0266	0.0278	0.3417	2.1169	1.4791	-2.7203	0.0126	0.0188	3.1476
Extra-EU	0.5338	0.5244	-0.1358	0.0102	0.0152	3.1120	4.3406	3.3807	-1.9042	0.0024	0.0045	5.1136
World	0.7365	0.6874	-0.5291	0.0125	0.0139	0.8095	2.8091	2.0270	-2.4786	0.0045	0.0069	3.3717

Notes: For period t , EM_{jmt}^{II} represents the extensive margin (eq. 5), IM_{jmt}^{II} is the intensive margin (eq. 6), P_{jmt}^{II} is the price component (eq. 8), and Q_{jmt}^{II} is the quantity component (eq. 7). $g_{EM_{jm}^{II}}$, $g_{IM_{jm}^{II}}$, $g_{P_{jm}^{II}}$, and $g_{Q_{jm}^{II}}$ are the growth rates of the extensive margin, intensive margin, price component and quantity component. A formula similar to equation (2) was used to calculate the growth rates of each margin.

Source: Authors' own calculations based on CEPII's BACI database at the 6-digit level of 1996 Harmonized System.

Table 4c. Decomposition of Austria's export shares into extensive margin, price and quantity component by main destination countries and region, intermediate goods trade, 1998-2011.

Country	EM_{jmt}^{II}	EM_{jmt+1}^{II}	$g_{EM_{jm}^{II}}$	IM_{jmt}^{II}	IM_{jmt+1}^{II}	$g_{IM_{jm}^{II}}$	P_{jmt}^{II}	P_{jmt+1}^{II}	$g_{P_{jm}^{II}}$	Q_{jmt}^{II}	Q_{jmt+1}^{II}	$g_{Q_{jm}^{II}}$
Belgium-Lux	0.6780	0.5794	-1.2011	0.0124	0.0120	-0.2428	5.0328	2.1107	-6.4657	0.0025	0.0057	6.6530
Brazil	0.4528	0.3445	-2.0820	0.0118	0.0163	2.5349	2.4545	1.3428	-4.5338	0.0048	0.0121	7.4044
Canada	0.5166	0.4977	-0.2873	0.0075	0.0092	1.5803	8.4987	1.9485	-10.7115	0.0009	0.0047	13.7663
China	0.4557	0.3820	-1.3486	0.0055	0.0048	-1.0214	3.6424	1.3441	-7.3817	0.0015	0.0036	6.8673
Croatia	0.8015	0.6009	-2.1906	0.1062	0.0970	-0.6915	73.4288	1.2079	-27.0910	0.0014	0.0803	36.2088
Czech Rep.	0.8619	0.6644	-1.9826	0.0728	0.0409	-4.3324	9.9584	3.4540	-7.8224	0.0073	0.0119	3.7862
France	0.7659	0.7427	-0.2364	0.0126	0.0138	0.6636	2.5396	1.8485	-2.4135	0.0050	0.0074	3.1532
Germany	0.9406	0.7206	-2.0290	0.0553	0.0602	0.6614	1.4028	1.1543	-1.4887	0.0394	0.0522	2.1826
Hungary	0.9259	0.6994	-2.1344	0.1211	0.0743	-3.6891	1.0622	1.1309	0.4836	0.1140	0.0657	-4.1526
Italy	0.8299	0.5904	-2.5853	0.0382	0.0374	-0.1488	2.2548	1.1012	-5.3637	0.0169	0.0340	5.5105
Japan	0.3837	0.1676	-6.1700	0.0065	0.0107	3.8975	2.1452	2.1726	0.0977	0.0030	0.0049	3.7961
S. Korea	0.4171	0.2607	-3.5503	0.0067	0.0086	1.9908	1.5489	1.1863	-2.0307	0.0043	0.0073	4.1049
Netherlands	0.6790	0.4669	-2.8403	0.0110	0.0100	-0.7263	1.4105	1.5325	0.6401	0.0078	0.0066	-1.3577
Poland	0.7288	0.7421	0.1387	0.0308	0.0273	-0.9271	1.2818	7.3485	14.3765	0.0241	0.0037	-13.3800
Romania	0.7208	0.6357	-0.9625	0.0356	0.0504	2.7123	3.6172	1.6117	-6.0291	0.0098	0.0313	9.3023
Russia.	0.6263	0.5478	-1.0250	0.0193	0.0178	-0.6206	10.3854	2.8969	-9.3543	0.0019	0.0061	9.6350
India	0.4024	0.3924	-0.1923	0.0054	0.0051	-0.5669	1.8910	1.7640	-0.5333	0.0029	0.0029	-0.0338
Slovakia	0.7656	0.7016	-0.6698	0.0654	0.0400	-3.7120	19.3442	6.8522	-7.6729	0.0034	0.0058	4.2901
Slovenia	0.9208	0.7917	-1.1558	0.1060	0.1139	0.5546	209.1106	1.2280	-32.6447	0.0005	0.0927	49.2898
Spain	0.6898	0.4966	-2.4964	0.0198	0.0180	-0.7677	2.5363	1.3724	-4.6143	0.0078	0.0131	4.0327
Sweden	0.6936	0.3548	-5.0263	0.0281	0.0579	5.7260	3.0247	1.2362	-6.6514	0.0093	0.0469	13.2593
Switzerland	0.7878	0.7317	-0.5666	0.0570	0.0293	-4.9776	13.9989	1.0947	-17.8021	0.0041	0.0268	15.6020
Turkey	0.5346	0.5924	0.7934	0.0273	0.0132	-5.4467	38.2094	1.4411	-22.2855	0.0007	0.0091	21.6676
UK	0.7901	0.5488	-2.7636	0.0106	0.0128	1.4706	1.6913	1.5055	-0.8912	0.0063	0.0085	2.3830
USA	0.6976	0.4098	-4.0097	0.0061	0.0135	6.2697	2.2297	1.9822	-0.9010	0.0028	0.0068	7.2359
Intra-Euro	0.8697	0.7577	-1.0552	0.0572	0.0665	1.1567	2.3445	1.3320	-4.2559	0.0244	0.0499	5.6532
Extra-Euro	0.4890	0.3266	-3.0586	0.0218	0.0192	-0.9947	3.5430	2.0699	-4.0501	0.0062	0.0093	3.1843
Intra-EU	0.8603	0.7272	-1.2837	0.0436	0.0497	1.0185	2.4054	1.5388	-3.3781	0.0181	0.0323	4.5503
Extra-EU	0.4215	0.2820	-3.0455	0.0171	0.0151	-0.9442	3.9910	2.0583	-4.9661	0.0043	0.0074	4.2321
World	0.6641	0.4574	-2.8276	0.0207	0.0200	-0.2842	2.8851	1.6678	-4.1281	0.0072	0.0120	4.0094

Notes: For period t , EM_{jmt}^{II} represents the extensive margin (eq. 5), IM_{jmt}^{II} is the intensive margin (eq. 6), P_{jmt}^{II} is the price component (eq. 8), and Q_{jmt}^{II} is the quantity component (eq. 7). $g_{EM_{jm}^{II}}$, $g_{IM_{jm}^{II}}$, $g_{P_{jm}^{II}}$, and $g_{Q_{jm}^{II}}$ are the growth rates of the extensive margin, intensive margin, price component and quantity component. A formula similar to equation (2) was used to calculate the growth rates of each margin.

Source: Authors' Authors' own calculations based on CEPII's BACI database at the 6-digit level of 1996 Harmonized System.

Table 5a. Decomposition of Austria's export growth rates into extensive, price and quantity margin by main destination countries and region, total goods trade, 1998-2011.

Country	ER_{jm}^{III}	EM_{jm}^{III}	P_{jm}^{III}	Q_{jm}^{III}	$g_{ER_{jm}^{III}}$	$g_{EM_{jm}^{III}}$	$g_{P_{jm}^{III}}$	$g_{Q_{jm}^{III}}$	$r_{EM_{jm}^{III}}$	$r_{P_{jm}^{III}}$	$r_{Q_{jm}^{III}}$
Belgium-Lux	2.65	0.94	0.73	3.86	7.49	-0.51	-2.38	10.38	-6.75	-31.83	138.58
Brazil	3.43	0.86	0.64	6.27	9.49	-1.15	-3.48	14.12	-12.15	-36.64	148.79
Canada	2.10	0.78	0.02	161.79	5.70	-1.95	-31.48	39.13	-34.13	-551.89	686.01
China	10.20	1.06	1.06	9.02	17.86	0.48	0.46	16.92	2.71	2.56	94.73
Croatia	1.57	0.81	0.02	78.43	3.46	-1.60	-28.50	33.56	-46.07	-822.68	968.75
Czech Rep.	2.27	0.78	0.56	5.21	6.30	-1.92	-4.48	12.70	-30.40	-71.07	201.47
France	2.16	0.76	1.69	1.68	5.91	-2.12	4.03	4.00	-35.80	68.14	67.66
Germany	2.22	0.86	1.35	1.90	6.13	-1.13	2.32	4.94	-18.45	37.89	80.57
Hungary	2.05	0.71	1.81	1.59	5.51	-2.63	4.57	3.56	-47.65	82.99	64.66
Italy	1.92	0.86	0.92	2.45	5.02	-1.19	-0.68	6.89	-23.77	-13.48	137.26
Japan	2.54	0.89	1.72	1.65	7.18	-0.87	4.18	3.86	-12.08	58.27	53.81
S. Korea	4.93	0.87	1.16	4.90	12.27	-1.11	1.15	12.22	-9.01	9.39	99.61
Netherlands	1.90	0.87	1.67	1.30	4.94	-1.03	3.93	2.04	-20.84	79.51	41.33
Poland	3.82	0.89	8.00	0.54	10.31	-0.92	16.00	-4.78	-8.89	155.24	-46.35
Romania	7.06	0.99	0.61	11.61	15.03	-0.06	-3.77	18.86	-0.38	-25.07	125.45
Russia	5.97	0.93	0.64	10.08	13.74	-0.59	-3.44	17.77	-4.27	-25.06	129.33
India	11.01	1.37	1.35	5.95	18.45	2.42	2.31	13.72	13.12	12.54	74.34
Slovakia	3.15	0.84	0.48	7.81	8.82	-1.38	-5.61	15.82	-15.67	-63.57	179.24
Slovenia	2.68	0.88	0.01	343.27	7.58	-1.00	-36.34	44.91	-13.17	-479.46	592.63
Spain	1.50	1.01	0.83	1.79	3.11	0.11	-1.47	4.46	3.62	-47.21	143.59
Sweden	1.63	0.51	0.14	22.18	3.75	-5.23	-14.86	23.84	-139.47	-396.30	635.77
Switzerland	2.27	0.74	0.26	11.94	6.31	-2.32	-10.45	19.08	-36.75	-165.74	302.49
Turkey	2.60	1.01	0.11	23.08	7.36	0.08	-16.87	24.15	1.13	-229.07	327.94
UK	1.80	0.90	1.30	1.53	4.50	-0.79	2.01	3.29	-17.55	44.57	72.99
USA	2.99	0.75	1.65	2.43	8.44	-2.22	3.84	6.82	-26.33	45.50	80.84
Intra-Euro	2.14	0.97	1.43	1.56	5.86	-0.27	2.73	3.40	-4.57	46.55	58.02
Extra-Euro	2.83	0.99	1.26	2.26	8.01	-0.06	1.79	6.29	-0.77	22.29	78.47
Intra-EU	2.20	0.97	1.44	1.58	6.07	-0.24	2.80	3.51	-4.03	46.21	57.82
Extra-EU	3.14	0.99	1.20	2.64	8.79	-0.05	1.38	7.46	-0.57	15.71	84.86
World	2.43	0.99	1.39	1.77	6.84	-0.10	2.53	4.41	-1.45	36.94	64.51

Notes: ER_{jm}^{III} represents the export ratio between the two time periods, 1998 and 2011 (eq. 11), EM_{jm}^{III} is the extensive margin (eq. 12), P_{jm}^{III} is the price margin (eq. 13), and Q_{jm}^{III} is the quantity margin (eq. 13). $g_{EM_{jm}^{III}}$, $g_{P_{jm}^{III}}$, and $g_{Q_{jm}^{III}}$ are the growth rates of the extensive margin, price margin and quantity margin. The following formula was used to calculate the growth rates of the export ratio: $g_{ER_{jm}^{III}} = 100 \times \ln(ER_{jm}^{III}) / \{(t+1) - (t)\}$. Similar equations were used for the other margins. $r_{EM_{jm}^{III}}$, $r_{P_{jm}^{III}}$, and $r_{Q_{jm}^{III}}$ are the contribution ratios of each margin (eq. 17a-17c).

Source: Authors' own calculations based on CEPII's BACI database at the 6-digit level of 1996 Harmonized System.

Table 5b. Decomposition of Austria's export growth rates into extensive, price and quantity margin by main destination countries and region, final goods trade, 1998-2011.

Country	ER_{jm}^{III}	EM_{jm}^{III}	P_{jm}^{III}	Q_{jm}^{III}	$g_{ER_{jm}^{III}}$	$g_{EM_{jm}^{III}}$	$g_{P_{jm}^{III}}$	$g_{Q_{jm}^{III}}$	$r_{EM_{jm}^{III}}$	$r_{P_{jm}^{III}}$	$r_{Q_{jm}^{III}}$
Belgium-Lux	4.15	0.93	0.89	5.05	10.94	-0.60	-0.92	12.46	-5.48	-8.44	113.92
Brazil	14.15	0.87	0.63	26.03	20.38	-1.10	-3.58	25.07	-5.41	-17.57	122.99
Canada	2.63	0.90	2.42	1.21	7.43	-0.84	6.81	1.46	-11.24	91.60	19.64
China	7.17	1.81	1.20	3.31	15.16	4.54	1.40	9.21	29.98	9.23	60.78
Croatia	1.14	0.84	0.04	36.88	1.02	-1.33	-25.39	27.75	-130.33	-2479.44	2709.77
Czech Rep.	2.81	0.82	0.26	13.08	7.95	-1.55	-10.28	19.78	-19.51	-129.35	248.86
France	1.55	0.70	2.65	0.83	3.39	-2.73	7.51	-1.39	-80.47	221.42	-40.95
Germany	2.26	0.91	1.45	1.72	6.28	-0.74	2.84	4.18	-11.74	45.17	66.57
Hungary	3.52	0.87	1.79	2.26	9.68	-1.06	4.46	6.27	-10.92	46.11	64.82
Italy	2.07	0.86	1.20	2.02	5.60	-1.21	1.39	5.42	-21.50	24.76	96.74
Japan	2.13	0.83	1.55	1.65	5.80	-1.45	3.38	3.87	-25.03	58.29	66.73
S. Korea	13.28	4.16	0.47	6.84	19.89	10.96	-5.86	14.79	55.11	-29.47	74.35
Netherlands	1.82	0.79	1.81	1.28	4.62	-1.86	4.57	1.91	-40.16	98.92	41.24
Poland	3.27	0.97	2.68	1.25	9.12	-0.21	7.58	1.74	-2.25	83.14	19.11
Romania	5.67	1.02	0.33	16.65	13.35	0.18	-8.47	21.63	1.37	-63.42	162.05
Russia	6.64	0.97	1.73	3.96	14.56	-0.22	4.20	10.58	-1.52	28.86	72.66
India	13.40	1.17	1.73	6.63	19.97	1.21	4.21	14.55	6.04	21.08	72.89
Slovakia	2.91	0.81	0.57	6.36	8.23	-1.62	-4.38	14.23	-19.74	-53.19	172.93
Slovenia	2.95	0.84	0.01	371.33	8.33	-1.32	-35.87	45.52	-15.82	-430.56	546.38
Spain	3.16	1.28	0.82	3.03	8.86	1.88	-1.54	8.52	21.18	-17.35	96.17
Sweden	1.93	0.89	0.03	69.80	5.07	-0.93	-26.66	32.66	-18.43	-525.81	644.25
Switzerland	3.75	0.78	1.05	4.57	10.17	-1.89	0.36	11.69	-18.59	3.58	115.01
Turkey	5.43	0.78	0.70	9.95	13.02	-1.93	-2.73	17.68	-14.82	-20.96	135.78
UK	1.77	1.10	0.98	1.63	4.39	0.75	-0.12	3.77	16.98	-2.71	85.73
USA	4.78	0.93	3.65	1.40	12.03	-0.54	9.96	2.61	-4.53	82.82	21.71
Intra-Euro	2.22	0.97	1.46	1.57	6.14	-0.23	2.90	3.47	-3.73	47.27	56.46
Extra-Euro	3.52	1.06	1.35	2.47	9.68	0.43	2.28	6.97	4.40	23.58	72.02
Intra-EU	2.33	0.99	1.35	1.76	6.50	-0.12	2.28	4.33	-1.77	35.10	66.67
Extra-EU	4.11	1.06	1.60	2.42	10.88	0.46	3.63	6.79	4.22	33.36	62.43
World	2.76	1.04	1.55	1.72	7.82	0.27	3.40	4.15	3.51	43.42	53.07

Notes: ER_{jm}^{III} represents the export ratio between the two time periods, 1998 and 2011 (eq. 11), EM_{jm}^{III} is the extensive margin (eq. 12), P_{jm}^{III} is the price margin (eq. 13), and Q_{jm}^{III} is the quantity margin (eq. 13). $g_{EM_{jm}^{III}}$, $g_{P_{jm}^{III}}$, and $g_{Q_{jm}^{III}}$ are the growth rates of the extensive margin, price margin and quantity margin. The following formula was used to calculate the growth rates of the export ratio: $g_{ER_{jm}^{III}} = 100 \times \ln(ER_{jm}^{III}) / \{(t+1) - (t)\}$. Similar equations were used for the other margins. $r_{EM_{jm}^{III}}$, $r_{P_{jm}^{III}}$, and $r_{Q_{jm}^{III}}$ are the contribution ratios of each margin (eq. 17a-17c).

Source: Authors' own calculations based on CEPII's BACI database at the 6-digit level of 1996 Harmonized System.

Table 5c. Decomposition of Austria's export growth rates into extensive, price and quantity margin by main destination countries and region, intermediate goods trade, 1998-2011.

Country	ER_{jm}^{III}	EM_{jm}^{III}	P_{jm}^{III}	Q_{jm}^{III}	$g_{ER_{jm}^{III}}$	$g_{EM_{jm}^{III}}$	$g_{P_{jm}^{III}}$	$g_{Q_{jm}^{III}}$	$r_{EM_{jm}^{III}}$	$r_{P_{jm}^{III}}$	$r_{Q_{jm}^{III}}$
Belg-Lux	2.47	0.94	0.83	3.17	6.96	-0.46	-1.46	8.89	-6.64	-21.02	127.66
Brazil	3.13	0.72	0.34	12.79	8.79	-2.51	-8.30	19.60	-28.60	-94.47	223.07
Canada	1.70	0.66	0.00	1260.65	4.09	-3.24	-47.59	54.92	-79.06	-1162.82	1341.88
China	8.84	1.07	0.72	11.45	16.77	0.52	-2.51	18.76	3.09	-14.97	111.88
Croatia	1.92	0.79	0.01	187.54	5.03	-1.82	-33.41	40.26	-36.25	-663.86	800.10
Czech Rep.	2.07	0.71	0.31	9.41	5.59	-2.68	-8.97	17.24	-48.03	-160.57	308.60
France	2.15	0.75	0.91	3.17	5.90	-2.25	-0.72	8.87	-38.07	-12.24	150.31
Germany	2.24	0.82	1.34	2.03	6.22	-1.49	2.26	5.45	-23.95	36.34	87.61
Hungary	1.68	0.65	1.79	1.44	3.99	-3.31	4.49	2.81	-83.03	112.56	70.47
Italy	1.87	0.84	0.88	2.53	4.83	-1.36	-0.95	7.13	-28.09	-19.61	147.70
Japan	2.65	0.86	1.73	1.77	7.49	-1.13	4.24	4.38	-15.13	56.59	58.54
S. Korea	4.64	0.71	1.10	5.96	11.80	-2.67	0.74	13.73	-22.60	6.26	116.33
Netherlands	1.99	0.86	1.69	1.38	5.30	-1.20	4.02	2.49	-22.70	75.75	46.95
Poland	4.12	0.85	12.18	0.40	10.89	-1.23	19.23	-7.11	-11.27	176.55	-65.28
Romania	7.62	1.02	0.65	11.45	15.62	0.13	-3.26	18.75	0.83	-20.85	120.02
Russia	4.87	0.81	0.39	15.49	12.18	-1.59	-7.31	21.08	-13.09	-60.05	173.14
India	10.76	1.47	1.54	4.78	18.27	2.94	3.30	12.03	16.11	18.06	65.83
Slovakia	2.80	0.82	0.52	6.53	7.93	-1.49	-5.01	14.44	-18.84	-63.25	182.09
Slovenia	2.47	0.87	0.00	653.43	6.95	-1.10	-41.81	49.86	-15.80	-601.55	717.35
Spain	1.55	0.95	0.72	2.27	3.37	-0.39	-2.56	6.32	-11.60	-75.74	187.34
Sweden	1.49	0.36	0.17	24.57	3.05	-7.83	-13.75	24.63	-256.59	-450.74	807.33
Switzerland	1.55	0.65	0.07	34.54	3.36	-3.28	-20.60	27.25	-97.68	-612.68	810.36
Turkey	2.35	0.93	0.06	44.11	6.56	-0.55	-22.02	29.13	-8.32	-335.41	443.73
UK	1.77	0.74	1.20	2.00	4.40	-2.32	1.37	5.35	-52.83	31.18	121.65
USA	2.47	0.63	1.32	2.99	6.97	-3.57	2.11	8.43	-51.26	30.24	121.02
Intra-Euro	2.13	0.96	1.43	1.55	5.81	-0.29	2.75	3.36	-4.98	47.21	57.77
Extra-Euro	2.47	0.98	1.25	2.03	6.96	-0.18	1.71	5.44	-2.59	24.53	78.06
Intra-EU	2.15	0.96	1.45	1.54	5.90	-0.28	2.86	3.32	-4.81	48.58	56.23
Extra-EU	2.66	0.97	1.10	2.49	7.52	-0.23	0.72	7.03	-3.02	9.51	93.51
World	2.27	0.98	1.39	1.67	6.29	-0.17	2.51	3.95	-2.77	39.95	62.81

Notes: ER_{jm}^{III} represents the export ratio between the two time periods, 1998 and 2011 (eq. 11), EM_{jm}^{III} is the extensive margin (eq. 12), P_{jm}^{III} is the price margin (eq. 13), and Q_{jm}^{III} is the quantity margin (eq. 13). $g_{EM_{jm}^{III}}$, $g_{P_{jm}^{III}}$, and $g_{Q_{jm}^{III}}$ are the growth rates of the extensive margin, price margin and quantity margin. The following formula was used to calculate the growth rates of the export ratio: $g_{ER_{jm}^{III}} = 100 \times \ln(ER_{jm}^{III}) / \{(t+1) - (t)\}$. Similar equations were used for the other margins. $r_{EM_{jm}^{III}}$, $r_{P_{jm}^{III}}$, and $r_{Q_{jm}^{III}}$ are the contribution ratios of each margin (eq. 17a-17c).

Source: Authors' own calculations based on CEPII's BACI database at the 6-digit level of 1996 Harmonized System.