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A Mesoeconomic Analysis

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Abstract

In this paper we do a detailed analysis of Austrian gross export data at the industry level in order to detect potential trade specialisation lock-in effects vis-à-vis the countries from Central, East and Southeast Europe (CESEE). In addition we analyse Austrian global value added export development, Austrian trade in services as well as the link between industry-specific specialisation lock-in effects and foundational competitiveness of Austria. The main findings are: the Austrian global gross export market share has declined since 2004 (the year of the EU eastern enlargement) in all industries, except for pharmaceuticals and chemicals; however, Austria managed to increase its global export market share in terms of value added, primarily through an increase in price competitiveness; Austria's CESEE potential lock-in effects have stagnated since the outbreak of the global financial crisis, with some negative effects only in the medium-high-tech industries (i.e. to a large extent the automotive sector) on Austria's competitiveness.

Keywords: Austria, CESEE, competitiveness, international trade, manufacturing exports, services trade

JEL classification: F14, L60, L80

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1. Introduction

Austria's economic competitiveness seems to have deteriorated in the past and this causes concern to the country's wider public. Since the Eastern Enlargement of the EU in 2004, Austria has lost global export market shares and recent research (Fenz et al., 2015) has stressed the fact that the Austrian economy has lost in terms of goods exports shares to Germany over the last couple of years and these were replaced by higher shares of exports to the countries of Central, East and Southeast Europe (CESEE). Overall this was seen as an additional indicator of a decline in Austrian competitiveness. How has Austrian external competitiveness developed after the accession of many CESEE economies to the EU, which role have CESEE countries played in this process in particular and how have trade relationships with Germany evolved?

This research is aimed at comparing competitiveness indicators at the industry level, focusing on indicators of external competitiveness. Thus, the analysis here will have a major focus on trade issues such as the revealed comparative advantage of various sectors, intra-industrial trade in intermediaries and final consumption goods, export performance or the quality of traded goods. It will also be possible to explore information on value chains and value-added trade. Specifically, the Austrian role in the supply chains with CESEE as well as Germany will be looked at. Thus, this paper looks in detail at the industry level of the Austrian economy. It analyses patterns of external competitiveness and their changes over time. It tries to answer the question as to how Austria's opening to the Eastern neighbours has altered these patterns: Did the opening to the East support Austrian competitiveness or did it create a lock-in effect?

The paper is structured as follows: The next section looks at data issues of various trade databases and the Rotterdam/Schwechat effect of Austrian trade. Section 3 then turns to identifying stylised facts of Austrian export performance and the role of Central, East and Southeast European countries (CESEE) therein. Section 4 analyses the input and output structure of the Austrian economy in detail and the importance of CESEE countries in final and intermediate trade. Section 5 then looks at linkages between Germany, Austria and the CESEE in the transport equipment sector. A summary is then given. In addition, we have three excursus sections – one on the development and decomposition of global market shares, one on services trade and one on technological and regional specialisation and its impact on foundational competitiveness.

2. Data issues and the Rotterdam/Schwechat effect of Austrian trade

WHICH OF THE FOLLOWING STATEMENTS IS CORRECT?

In 2017, Austria exported EUR 7 bn of goods to Slovakia, thus making Slovakia the 5th largest export destination of Austria. On the other hand, Austria imported goods worth EUR 4.3 bn from Slovakia, making it the 8th largest import country. Thus, Austria held a trade surplus with Slovakia of EUR 2.9 bn.

In 2017, Austria exported EUR 2.9 bn of goods to Slovakia, thus making Slovakia the tenth largest export destination of Austria. On the other hand, Austria imported goods worth EUR 3bn from Slovakia, thus registering a trade deficit of EUR 0.1 bn.

In fact, both statements are correct, depending on the source of trade data. While the first data is taken from the Eurostat Comext database, the second one stems from the Austrian Statistical Office. Depending on which database/source you use, different evidence emerges. Thus, the choice of dataset is of importance and so needs a short investigation first.

Differences in bilateral trade data are well known and investigated in the literature (see Javorsek, 2016; Granner and Egerer, 2007; Sieringer and Wohlmuth, 2013). When country A exports to country B, country B imports from country A and these flows should be equal. This is referred to as mirror statistics. However, discrepancies emerge in these data which are known as bilateral trade asymmetries. These asymmetries may be due to many reasons. Foreign trade statistics (FTS) are collected at the national level and may differ in their methodologies, concept and scope. National trade data are then sent to international organisations for building international trade databases, trying to use a common methodology, which might then lead to further differences among databases.

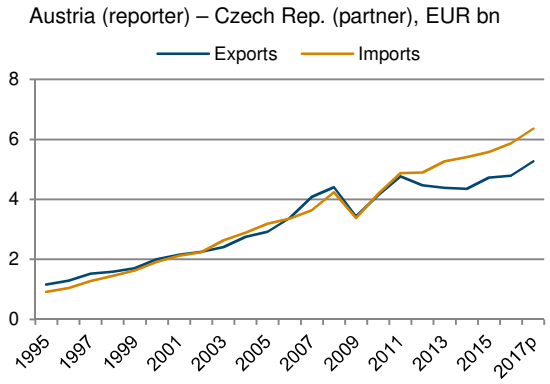
This chapter will compare bilateral trade data between Austria and its neighbouring countries including the Czech Republic, Hungary and Slovakia. Data from the national statistical offices will be compared to Eurostat Comext data and the UN Comtrade database in order to reveal differences and similarities. The comparison will be made over time and for one year and reasons for differences between these data are explored. The main aim of this chapter is to identify the most appropriate database for the analysis of the external competitiveness of Austria in the next section.

Long-term trends

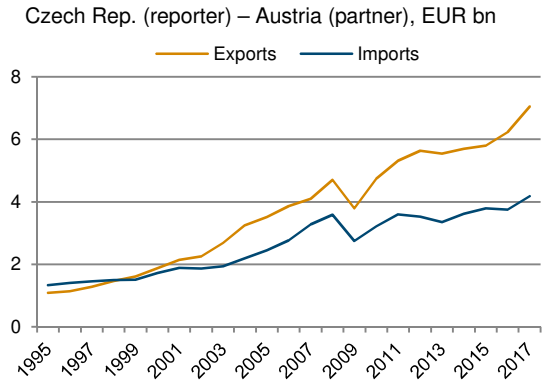
Figures 1-3 show the evolution of trade between Austria and its three neighbouring countries using three different datasets (national, Eurostat Comext and UN Comtrade). Looking first at the trade relationship between Austria and the Czech Republic (Figure 1), we find a strong expansion of trade between 1995 and 2017, with exports and imports growing in line and Austria exhibiting a mostly balanced trade position up until 2011. Since then Austria has recorded a growing trade deficit (Austrian as a reporter). From the Czech point of view (as a reporter), Austria has recorded a trade deficit for a longer period which has become larger since 2012.

Figure 1 / Comparison of trade between Austria and the Czech Republic, total trade, 1995-2017

National Statistical Institutes

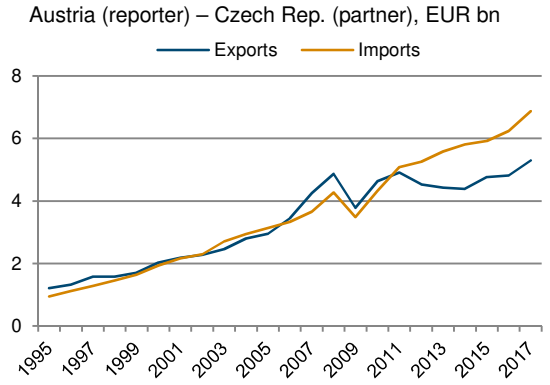


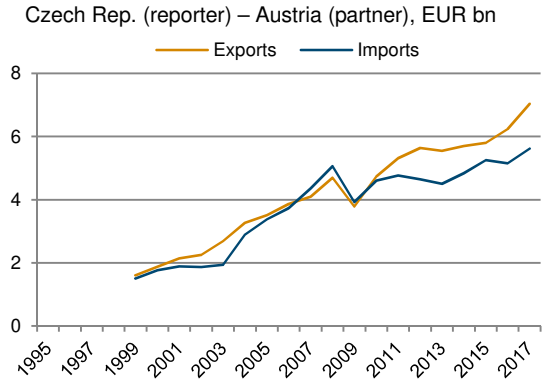
Source: Statistics Austria.



Source: wiiw Annual Database, Czech Statistical Office.

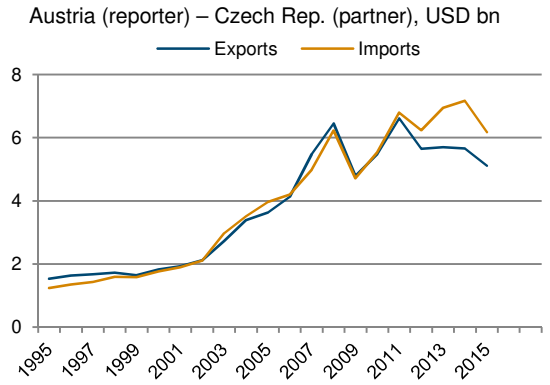
Eurostat Comext

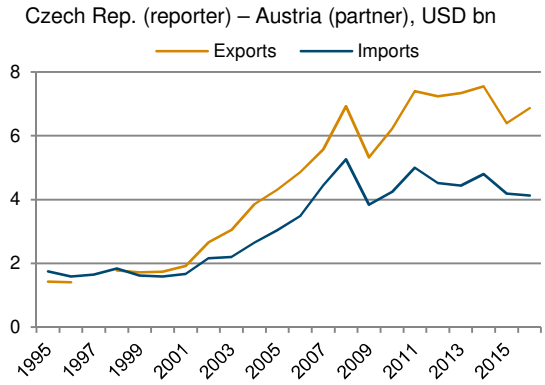




Source: Eurostat.

UN Comtrade





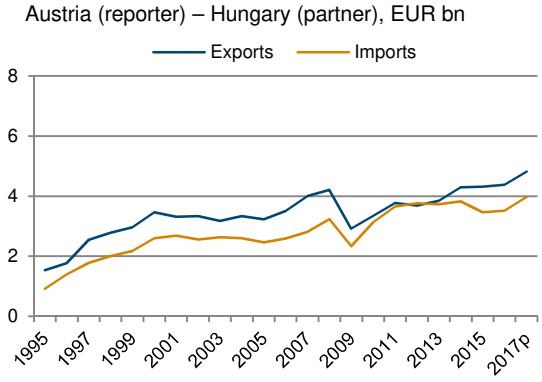
Note: 2016 data for Austria as a reporter not included.
Source: UN Comtrade.

The trade relationship between Austria and Hungary between 1995 and 2017 (Figure 2) shows a flatter development with a trade surplus for Austria. The Eurostat Comext database exhibits a trade deficit for

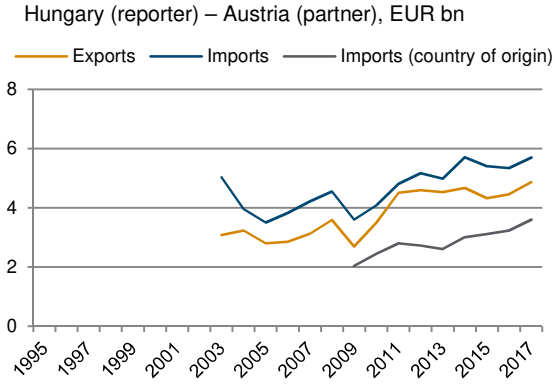
Austria (as a reporter) between 2001-2004 and 2012 but a trade surplus for the other years.

Figure 2 / Comparison of trade between Austria and Hungary, total trade, 1995-2017

National Statistical Institutes

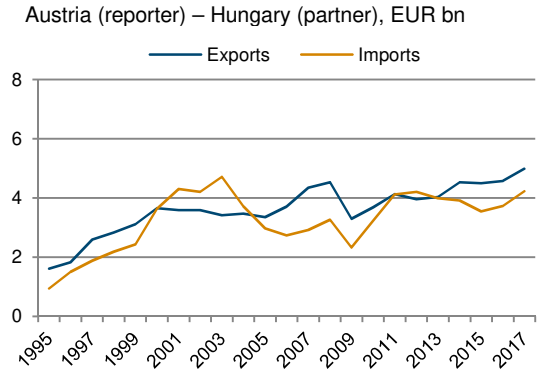


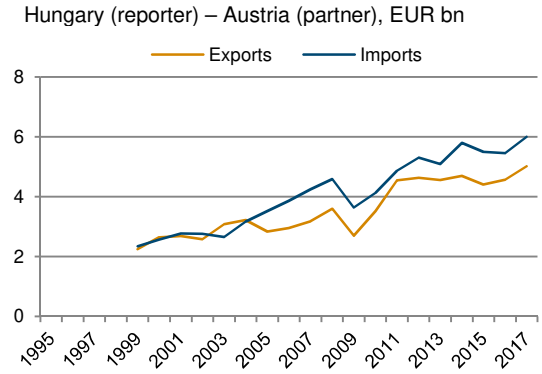
Source: Statistics Austria.



Note: Break in data 2003/2004 due to EU accession.
Source: Hungarian Central Statistical Office.

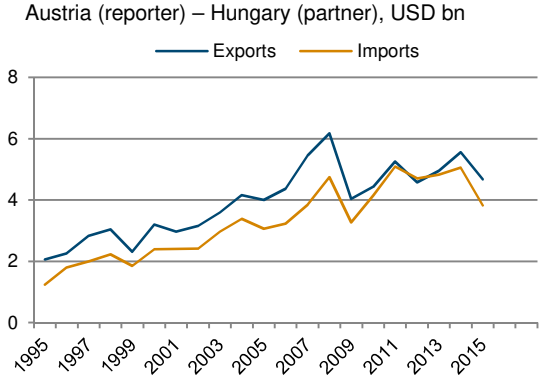
Eurostat Comext

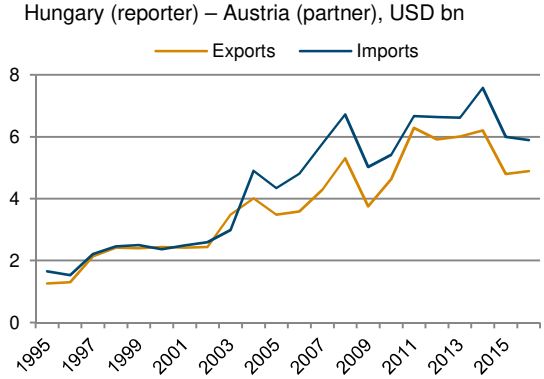




Source: Eurostat.

UN Comtrade

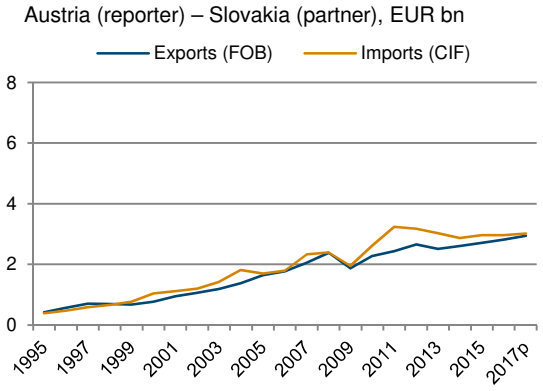




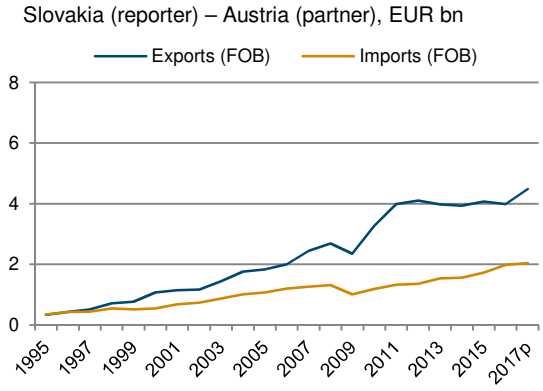
Note: 2016 data for Austria as a reporter not included.
Source: UN Comtrade.

Figure 3 / Comparison of trade between Austria and Slovakia, total trade, 1995-2017

National Statistical Institutes

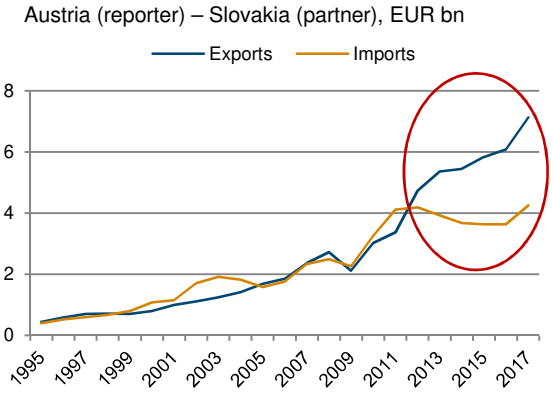


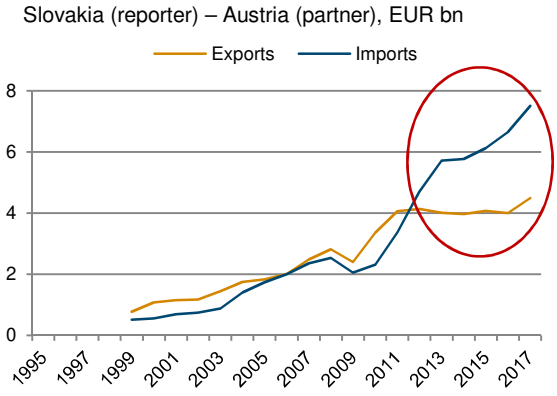
Source: Statistics Austria.



Source: wiiw Annual Database, Statistical Office of the Slovak Rep.

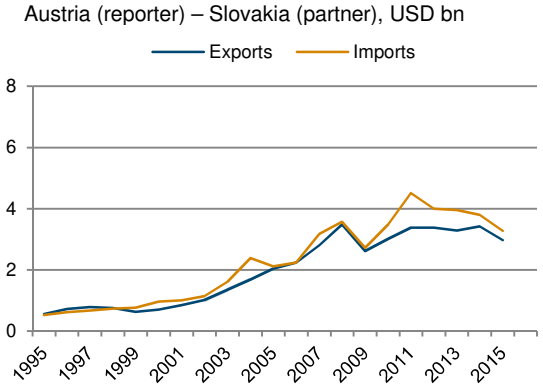
Eurostat Comext

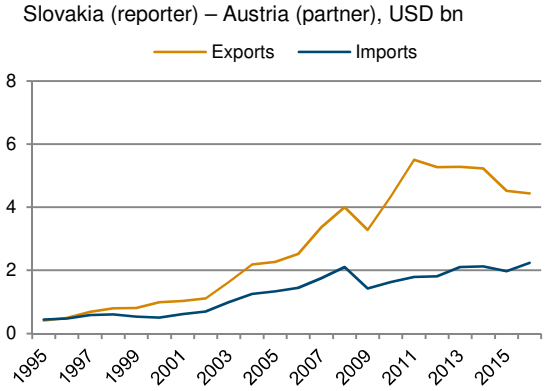




Source: Eurostat.

UN Comtrade





Note: 2016 data for Austria as a reporter not included.
Source: UN Comtrade.

The trade relationship between Austria and Slovakia between 1995 and 2017 (Figure 3) exhibits growing trade, with a trade deficit for Austria, which is larger when reporting is done by Slovakia. Most

interestingly, since 2012, in the Comext Database, Austria's trade deficit turned around and now Austria is recording a trade surplus with Slovakia, which has been increasing strongly since then. Can different methodologies explain this trade surplus (of EUR about 3 bn in 2017), which does not exist in the other databases? What has changed since 2012?

Methodological differences

Before going into more detail on methodologies of trade databases, we look first at a list of the main reasons for bilateral trade discrepancies. Trade asymmetries might occur because of (Javorsek, 2016; Granner and Egerer, 2007; Sieringer and Wohlmuth, 2013):

- Differences in attribution of trade partners: Comparison of country of destination with country of consignment/origin
- Differences in recording re-exports
- Differences in valuation of imports and exports
- Classification of products (new products)/partners
- Other differences in data collection (outward processing trade, repairs)
- Special group of goods and simplification of notice
- Reporting thresholds and non-response
- Confidentiality reasons
- Trade system: general trade system versus special trade system
- Currency conversion
- Time lag
- Break in time series (change of concepts, country groupings, etc.)
- Other reasons.

Javorsek (2016) states that the 'difference in attribution of partner country is one of the largest causes of asymmetries in trade statistics. Different countries use different methods of partner country attribution, which is a potential source of trade discrepancies'.

Within the European Union, the creation of the Single Market (1993) has led to the disappearance of internal borders and to the free movement of goods and services. Thus, recording of foreign trade information (goods) – which was formerly done by customs authorities – had to change too. Today, collecting trade data is done through two data collection systems: Extrastat and Intrastat. Extrastat data on trade in goods with non-EU countries are still collected by customs authorities and are based on the records of trade transactions in customs declarations by country of origin. Intrastat data are directly collected from intra-EU trade operators once a month based on country of consignment. Different exemption thresholds are applied. Member States may use a different concept at national level but they have to provide Eurostat with harmonised data according to the Community concept (Eurostat, 2016). With the accession to the EU (2004, 2007, 2013), new EU members thus had the possibility to keep their national concepts and send data according to the community concept to the EU, or to switch entirely to the community concept. Some kept national concepts, some did not.

Thus, differences between databases may be due to various reasons (see above) but the main methodological differences stem from attribution of partner country (country of origin or country of consignment). Overall, we can find the following differences among databases:

- **EU Member States national data on trade in goods (FTS) may differ from Eurostat Comext data but need not.** National concepts might exclude quasi-transit, thus excluding the so-called Rotterdam-effect. Intra-EU arrivals might record country of origin as the partner country. In addition, the trade system might be a general one (instead of special trade system[1] used in the community concept; see Eurostat, 2016).

- **Eurostat Comext data include quasi-transit and thus data are biased by the Rotterdam-effect.** Therefore trade data of important trade hubs may be overvalued (Member States with big ports or with external borders, particular the Netherlands, 'countries harbouring important entry points of extra-EU trade', see Peneder and Rammer, 2018).

- **UN Comtrade trade data should be different from Eurostat Comext data.** Trade data are recommended to record imports by country of origin and exports by country of last known destination. It is encouraged to exclude transit (UN, 2011).

One has to keep in mind that international foreign trade statistics differ from trade in goods in the balance of payments (BOP) and national accounts (NA). There are again different definitions and methodologies applicable. Most simplified, international trade in goods statistics are based on the concept of movement of goods whereas BOP and NA are based on the change of ownership. In addition, exports and imports are valued FOB in BOP and NA. New databases which connect input-output data and trade data, such as the World Input-Output Database (WIOD), are based on NA principles and thus also trade data are treated according to these principles.

Data comparison for one year

Looking at trade data for one year (2015) for trade between Austria and the Czech Republic, Hungary and Slovakia seems to reveal remarkable differences between the three different data sources (see Table 1):

[1] Under the general trade system, the statistical territory includes customs warehouses, all types of free zones, free circulation area and premises for inward processing. Under the special trade system, all these are excluded. For further details see Eurostat, 2016, page 15.

Table 1 / Comparison of trade between Austria and the Czech Republic, Hungary and Slovakia, 2015

Austria – Czech Rep. 2015, EUR bn	AT exports	AT imports	CZ exports	CZ imports
National	4.727	5.577	5.797	3.794
Eurostat	4.761	5.924	5.797	5.249
UN	4.608	5.567	5.764	3.776
Difference National-Eurostat	-0.034	-0.347	0.000	-1.454
Difference National-UN	0.119	0.010	0.033	0.018

Austria – Hungary 2015, EUR bn	AT exports	AT imports	HU exports	HU imports
National	4.318	3.457	4.322	5.407
National (country of origin)				3.110
Eurostat	4.499	3.551	4.409	5.500
UN	4.214	3.450	4.321	5.406
Difference National-Eurostat	-0.181	-0.094	-0.088	-0.093
Difference National (country of origin)-Eurostat				-2.390
Difference National-UN	0.104	0.007	0.001	0.001

Austria – Slovakia 2015, EUR bn	AT exports	AT imports	SK exports	SK imports
National	2.713	2.968	4.071	1.728
Eurostat	5.827	3.634	4.075	6.126
UN	2.677	2.953	4.069	1.782
Difference National-Eurostat	-3.114	-0.666	-0.004	-4.398
Difference National-UN	0.036	0.015	0.002	-0.054

Austria and Slovakia have their own national concepts (see methodology in Box 2) which are similar to UN Comtrade (main differences should be due to the exchange rate USD/EUR) and different from Eurostat. The differences are the largest observed – amounting to EUR 3 bn for Austrian exports (AT reporter) and even to EUR 4.3 bn for Slovak imports (Slovak reporter). One reason for these differences might be due to the importance of quasi-transit of goods through Vienna airport to Slovakia. Imports to Austria from extra-EU countries but heading to Slovakia would be attributed to Austria in the Comext Database as imports to Austria and exports of Austria (country of consignment) to Slovakia. Thus, the proximity of Vienna's Schwechat airport in Austria to Bratislava in Slovakia and the larger volume of goods transported by the former in contrast to the small Bratislava airport might be a possible explanation. The interpretation of data has then to be done with care: Austrian exports to Slovakia based on Comext data would include 50% quasi-transit; Slovak imports even 70%. The significance of Slovakia as a trading partner for Austria would be overestimated (and vice versa); the positive trade balance interpreted incorrectly. Overall, Austria could be termed a 'trade hub' for Slovakia and the 'Rotterdam effect' could be renamed as the 'Schwechat effect'.

BOX 1 / POSSIBLE EXPLANATION

Looking at more detailed trade data from the Comext-Database shows that Austrian exports to Slovakia increased by EUR 3 bn between 2011 and 2017 in one category:

HS 8517 – TELEPHONE SETS, INCL. TELEPHONES FOR CELLULAR NETWORKS OR FOR OTHER WIRELESS NETWORKS; OTHER APPARATUS FOR THE TRANSMISSION OR RECEPTION OF VOICE, IMAGES OR OTHER DATA, INCL. APPARATUS FOR COMMUNICATION IN A WIRED OR WIRELESS NETWORK [SUCH AS A LOCAL OR WIDE AREA NETWORK]; PARTS THEREOF (EXCL. THAN TRANSMISSION OR RECEPTION APPARATUS OF HEADING 8443, 8525, 8527 OR 8528).

A more detailed investigation into category HS 8517 in 2016 gives us the following information: In the year 2016, according to Eurostat Comext, Slovakia imported EUR 3bn of these products from Austria. According to national Slovak data, however, the imports from Austria in this category amounted to only EUR 78 million. Instead EUR 1bn were imported from China and EUR 2bn from Vietnam. Thus, one possible explanation for the discrepancies of data is the import of mobile phones via the airport of Schwechat to Austria from China and Vietnam and then heading to Slovakia.

Hungary applies no separate national concept, in fact national data, Eurostat Comext and UN Comtrade are almost the same. When joining the EU in 2004, the Hungarian Central Statistical Office took over the EU methodology, no own national concept was reported then. As such there is a break in data 2003/2004. Only recently, the Statistical Office provides a second dataset on imports by country of origin on their homepage, which shows a significant difference to national data of EUR 2.4 bn for the trade between Hungary and Austria.

The Czech Republic seems to have some national concept (but no detailed description is available on the website of the Czech Statistical Office). The difference between Czech national imports and that of Eurostat still amounts to EUR 1.5 bn.

Differences in trade data are long known and investigated and may arise due to various reasons. As the Rotterdam-effect inflates trade data of trade hubs it might play a role for bilateral trade between Austria and Slovakia. In order to exclude this effect, the UN Comtrade database is used for further analysis in the next chapter. However, it has to be kept in mind that even in this database a mix of methodologies occurs as seen in the case of Hungary.

BOX 2 / OVERVIEW OF CONCEPTS

Statistik Austria

Analysis and publication is done by national concept. Imports are recorded by country of origin. Quasi-transit trade is excluded from Austrian foreign trade statistics: Indirect imports denote imports from third countries to Austria, which are not destined to Austria but to any other Member State. Indirect exports implicate exports to third countries from Austria, if country of consignment is not Austria but any other Member State.

Czech Statistical Office

After the accession of the Czech Republic to the European Union, external trade of the Czech Republic is the total of intra-Community trade (trade with EU Member States) and trade with non-EU countries. Exports are the value of goods that were dispatched abroad and crossed the state border for the purpose of being left abroad, permanently or temporarily. Total exports consist of dispatches to EU Member States and exports to non-EU countries.
Imports are the value of goods that were received from abroad and crossed the state border for the purpose of being left in the Czech Republic, permanently or temporarily. Total imports consist of arrivals from EU Member States and imports from non-EU countries.

Hungarian Central Statistical Office

Major breaks in trade data:
1996/97: Since 1997 including external trade of industrial free zones. On 1st May 2004 industrial customs free zones were abolished.
2003/2004: Since 2004 imports have been surveyed according to the country of consignment as partner country. Previously, the partner country to be surveyed was the country of origin.

Statistical Office of the Slovak Republic

Data on foreign trade published by the Statistical Office of the SR are compiled based on the national concept: Data are published according to the country of origin (as for the total import) and the country of destination (in the total export). Values of the total import and export are compiled as FOB type values.

Eurostat Comext (EUR)

Data are published according to the country of origin concerning the import from non-Member States and the country of consignment concerning the import from the EU Member States. The export is released according to the country of destination.

The value of import is compiled as CIF type value, the value of export is compiled as FOB type value.

Box Table 1 / Conceptual differences between European statistics and national statistics

Country	General trade system	Exclusion of quasi transit	Inclusion of repairs	Country of origin	Other *)
AT		X		X	X
CZ				X	
HU		X			X
SK		X		X	X

Notes: *) Austria: Goods covered by Single Authorisation for Simplified Procedure (SASP) are included in national statistics.
Hungary: Extra-EU imports at national level are by country of consignment.
Slovakia: Import data are FOB.
Source: Eurostat (2016), p. 43.

UN Comtrade (USD)

In the case of imports, the country of origin is recorded; in the case of exports, the country of last known destination should be recorded. The statistical value of imported goods is a CIF-type value; the statistical value of exported goods is an FOB-type value.

Box Table 2 / Overview UN Comtrade statistics

Country	Goods Imports	Goods Exports	Trade System
AT	CIF, by origin	FOB, last known destination	Special
CZ	CIF, by origin	FOB, last known destination	Special
HU	CIF, by consignment	FOB, last known destination	Special
SK	CIF, by origin	FOB, last known destination	General

Source: UN (2017).

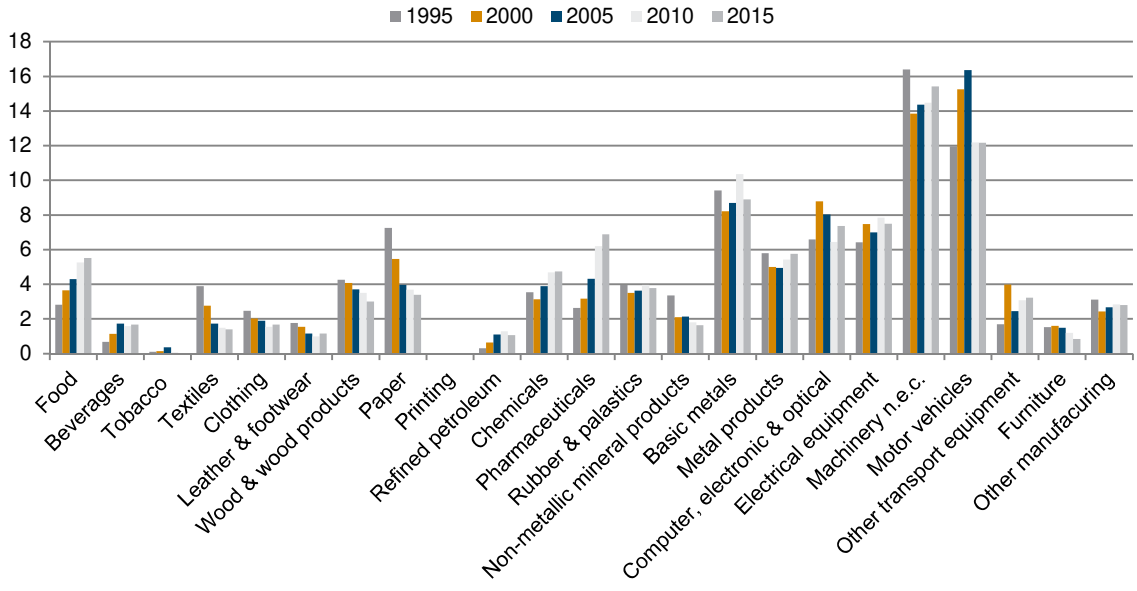
3. Stylised facts on Austrian trade and the role of CESEE

In order to measure external competitiveness traditional indicators based on trade data have been used and refined for a long time (see FIW's Österreichs Außenwirtschaft, various issues and EC's European Competitiveness Report, various issues). They provide a comprehensive background and thus this chapter will resort to these indicators in the first place.

We look at the following stylised facts concerning the Austrian trade structure and its change during the last 20 years: First, general issues of Austrian manufacturing trade and external competitiveness are presented; second, the role of CESEE in Austrian trade is explored. The main aim is to give a picture of Austrian manufacturing trade at a more detailed industry-level. Thus, the main indicators are presented at a 2-digit level; special results will be highlighted at the 3-digit level in the Annex. All data is based on the UN Comtrade database.

Looking at the Austrian export structure depicted in Figure 4, main export sectors in 2015 were machinery (15%) and motor vehicles (12%). These two major sectors were followed by basic metals, electrical equipment, computer, electronic & optical products, pharmaceutical products, metal products and food with shares above 5%. Together these sectors accounted for 70% of Austrian exports in 2015.

Figure 4 / Austrian export structure, 1995-2015, in % of manufacturing exports, NACE Rev. 2, 2-digit



Note: Confidential trade not allocated. Source: UN Comtrade.

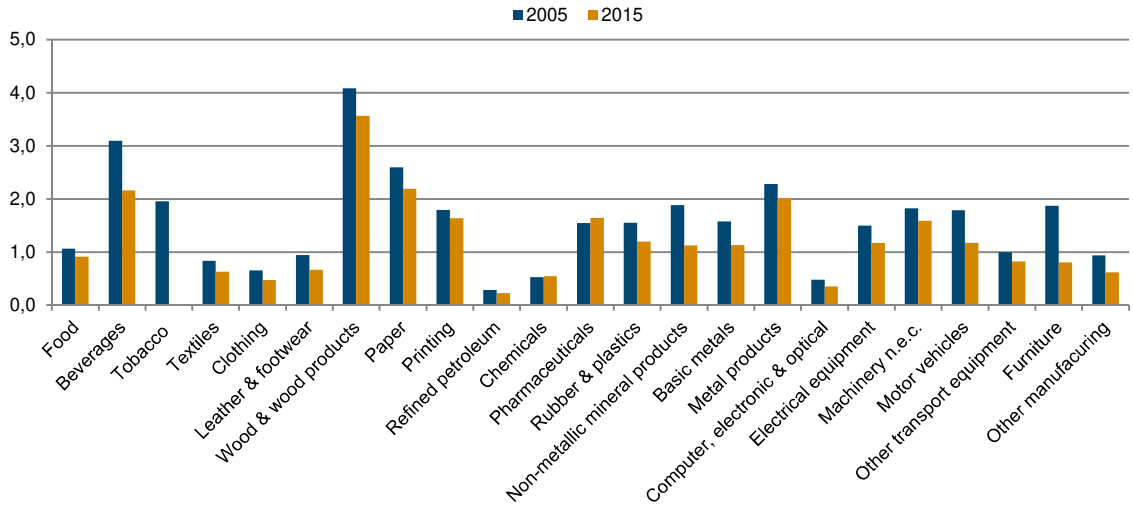
Between 1995 and 2015, the following export sectors gained in importance during the last 20 years: the pharmaceutical sector expanded most, by 4 percentage points, also the food sector gained in size by 3pp. Other transport equipment, chemicals, electrical equipment and beverages saw an increase of one percentage point each.

Export sectors which lost in size were the following: the largest decreases took place in the share of paper exports (-4pp), textiles (-2.5pp), non-metallic mineral products (-1.7pp) and wood (-1.3pp). Tobacco production ended in Austria in 2011, thus no further exports are registered thereafter. The large variability in the share of motor vehicles is due to fluctuations in motor vehicle assembly. While Austria has a major car parts manufacturing sector, assembly is done only by one major company (see Hanzl-Weiss, 2016).

The first indicator of external competitiveness presented here is the share of Austrian exports in world exports, i.e. Austrian market shares of various industries (see Figure 5).

In 2015, the largest world market shares by Austrian exports were held in wood & wood products with a world market share of nearly 4%. Paper products, beverages and metal products held world market shares of about 2%. Market shares between 1% and 2% were accounted for by another eight industries (in declining order): pharmaceuticals, printing, machinery, rubber & plastic products, electrical equipment, motor vehicles, basic metals and non-metallic mineral products. The remaining eleven industries showed market shares of below 1%. The smallest shares were visible for computer, electronic and optical products as well as for refined petroleum products (tobacco zero).

Figure 5 / Austrian world market shares, 2005-2015, in % of world exports, NACE Rev. 2, 2-digit



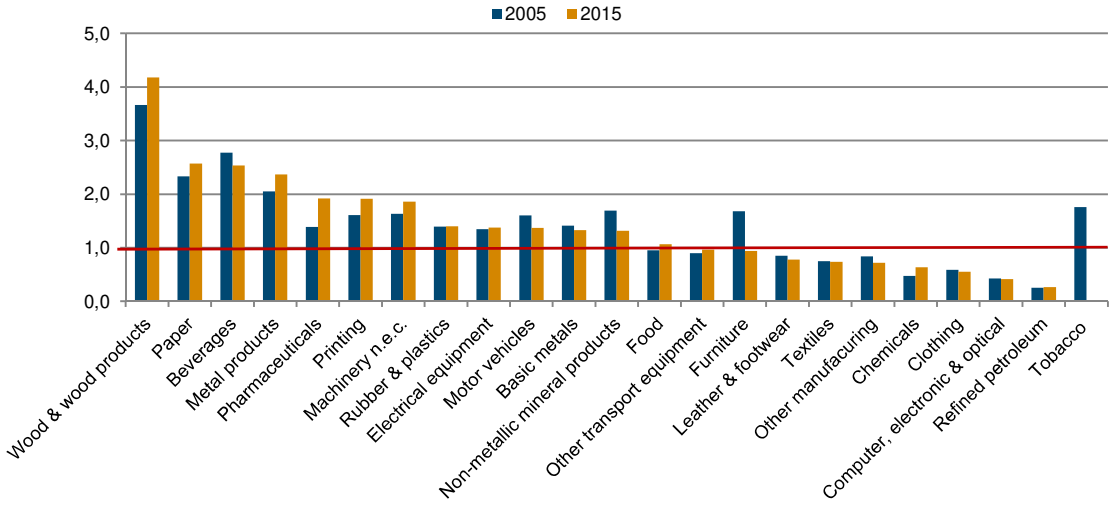
Note: Confidential trade not allocated. World trade includes all reporters contained in UN Comrade.
Source: UN Comtrade.

Between 2005 and 2015, world market shares declined in fact in almost all export sectors along with constantly dropping total Austrian market shares since 2004. There were only two exceptions: Market

shares of the pharmaceuticals industry increased slightly and that of chemicals stayed constant. Being the only two industries with a non-negative change, these two industries should be kept in mind.

The second indicator of competitiveness analysed in more detail is revealed comparative advantage (RCA) (see Figure 6). A sector with an RCA-value of higher than 1 can be interpreted as a sector exhibiting a comparative advantage.[2]

Figure 6 / Austrian RCAs, 2005-2015, NACE Rev. 2, 2-digit, ranked by 2015 values



Note: Confidential trade not allocated. World trade includes all reporters contained in UN Comrade Database (2005 includes 165 reporters and 2015 143). Balassa-Index.
Source: UN Comtrade.

In 2015, thirteen out of 23 Austrian export sectors showed a RCA value larger than 1, thus exhibiting a revealed comparative advantage: Largest RCAs were found for the wood industry, paper, beverages and metal product sectors. Between 2005 and 2015, in twelve export sectors RCAs increased, while in 11 sectors RCAs decreased. The largest increases were found for wood and pharmaceuticals, the largest decreases (besides tobacco) were for furniture and non-metallic mineral products.

Having set the stage on a general level, the role of CESEE in Austrian trade is explored in a next step. Overall, there has been a shift of Austrian trade partners in the last 20 years from the traditional ones in the West to the East. Germany as the main export destination of Austrian exports (with one third of Austrian exports) has also lost shares during that time period but largely kept its major role.

[2] As a measure of revealed comparative advantage (RCA), the Balassa Index is used. This index, which is based on exports only, is defined as

$$\mathrm{RCA}_{ijt} = \frac{\frac{\mathrm{EXP}_{ijt}}{\mathrm{EXP}_{jt}}}{\frac{\mathrm{EXP}_{it}}{\mathrm{EXP}_{t}}} = \frac{\mathrm{XTS}_{ijt}}{\mathrm{XTS}_{it}} = \frac{\frac{\mathrm{EXP}_{ijt}}{\mathrm{EXP}_{it}}}{\frac{\mathrm{EXP}_{jt}}{\mathrm{EXP}_{t}}} = \frac{\mathrm{WTS}_{ijt}}{\mathrm{WTS}_{jt}}$$

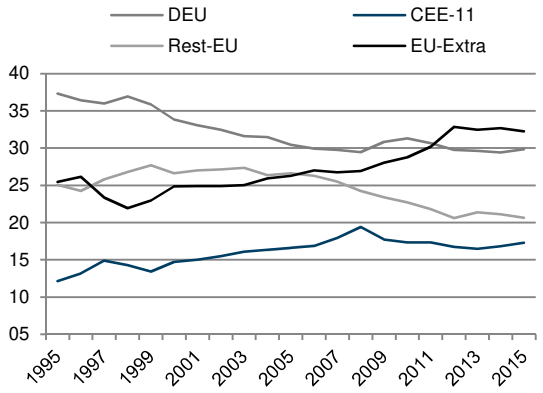
where RCA_{ijt} refers to the revealed compared advantage of industry i of country (or country group) j at time t; EXP_{ijt} refers to the exports of industry i of country j at time t; and EXP_{it} refers to global exports of that industry. Similarly, EXP_{jt} and EXP_{t} refer, respectively, to total exports of country j, and to total global exports at time t. Hence, the indicator compares the position of an industry in a particular country's export basket, relative to that industry's position in global exports. Alternatively, it shows the country's world trade share in a specific industry, relative to that country's share in global export flows. A value larger than 1 indicates that a country has a comparative advantage (CA) in the industry, i.e. is specialised relatively more in this industry's exports than the world average.

Over the long run, between 1995 and 2015 (see Figure 7.1), there was a decline in the share of Austrian manufacturing exports going to Germany (37% to 30%), as well as those going to the rest of the EU (25% to 21%) on the one hand. On the other, the share going to the new EU Member States (CEE-11) increased (12% to 17%), as well as exports to extra-EU destinations (26% to 32%).

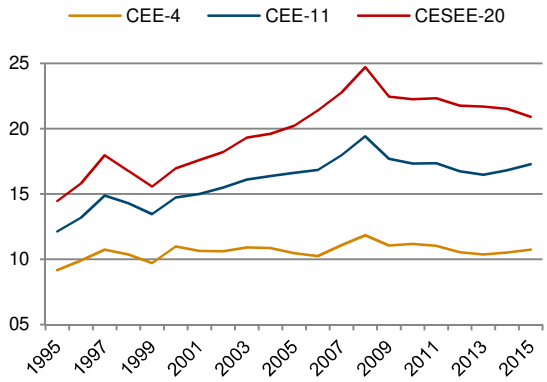
Looking at more detail for the CESEE region (see Figure 7.2) and various CEE groupings (CEE-4, CEE-11 and CESEE-20, for definition see note in Figure 7), we find that over the long run, there was generally an increase of export shares between 1995 and 2015. There was a continuous increase between 2000 and 2008, when exports to the CEE region peaked. Since then, however, shares slowly declined again. Distinguishing between three different CEE regions – the four neighbouring CEE-4 (the Czech Republic, Slovakia, Hungary, Slovenia), the EU-CEE-11 and finally the CESEE-20 – developments were quite similar. The line for the CEE-4 was somewhat flatter. Towards 2015, a slight increase can be seen for the export share going to the CEE-4 and the CEE-11, but a continued decline towards the CESEE-20. This was due to the strong devaluation of the Russian rouble and a corresponding decline of Austrian exports to this region.

Figure 7 / Main Austrian export destinations, manufacturing

7.1 Export share to main partner regions



7.2 Export share to CEE regions



Note: CEE-4: Czech Republic, Hungary, Slovakia and Slovenia.
CEE-11: CEE-4 plus Poland, Bulgaria, Romania, Estonia, Latvia, Lithuania and Croatia.
CESEE-20: CEE-11 plus Albania, Bosnia & Herzegovina, Macedonia, Moldova, Montenegro, Russia, Serbia, Turkey and Ukraine.
Source: UN Comtrade.

Looking at detailed 2-digit industry level figures, similar developments can be detected. Table 2 shows the share of CESEE-20 in Austrian manufacturing exports at various points in time. For almost all industries export shares to the CESEE-20 increased between 1995-2000 and in the boom period 2000-2008, while they declined in the crisis years between 2008-2011 in almost all sectors. Between 2011 and 2015, nine out of 23 industries increased export shares to CESEE-20 again. (At the industry level, the pharmaceutical industry was especially impacted in 2015 by the devaluation of the rouble and the decline of exports to Russia, Ukraine and Moldova.)

Table 2 / Share of CESEE-20 in Austrian manufacturing exports

In % of total trade, pp change over time

Sector		1995	2000	2004	2008	2011	2015	Short-term trends 1995-2000	2000-2008	2008-2011	2011-2015	Long-term trends 1995-2015	2004-2015
10	Food	25.1	16.1	17.6	25.9	27.9	21.6	-8.9	9.8	2.0	-6.3	-3.5	4.0
11	Beverages	31.6	9.2	8.5	16.0	10.7	11.5	-22.4	6.8	-5.2	0.8	-20.1	3.0
12	Tobacco	51.7	12.7	18.9	18.2	16.5	0.9	-39.0	5.4	-1.6	-15.7	-50.8	-18.0
13	Textiles	11.8	20.8	23.3	25.6	23.9	26.5	9.0	4.7	-1.7	2.5	14.6	3.1
14	Clothing	11.6	15.5	19.1	28.5	25.4	35.3	3.9	13.0	-3.1	9.9	23.7	16.2
15	Leather & footwear	15.4	23.1	36.0	42.1	35.0	44.9	7.7	19.0	-7.1	9.9	29.5	9.0
16	Wood & wood products	5.7	7.9	11.1	18.3	14.6	16.2	2.2	10.4	-3.7	1.7	10.5	5.1
17	Paper	12.7	18.8	20.4	25.0	25.6	25.3	6.1	6.2	0.6	-0.2	12.6	5.0
18	Printing	21.8	22.4	36.2	35.6	23.0	16.8	0.6	13.2	-12.6	-6.2	-4.9	-19.3
19	Refined petroleum	93.2	88.0	86.1	89.2	80.3	66.0	-5.2	1.2	-8.9	-14.2	-27.1	-20.1
20	Chemicals	29.6	34.0	30.6	31.9	30.5	28.8	4.4	-2.1	-1.4	-1.7	-0.8	-1.9
21	Pharmaceuticals	14.9	15.3	22.9	31.1	30.3	21.1	0.5	15.8	-0.8	-9.2	6.3	-1.7
22	Rubber & plastics	17.1	23.9	27.1	26.6	23.4	22.3	6.7	2.8	-3.2	-1.1	5.2	-4.8
23	Non-metallic mineral products	8.1	14.4	18.3	25.3	21.4	19.6	6.3	10.9	-3.9	-1.7	11.5	1.4
24	Basic metals	10.6	13.5	17.5	21.6	20.4	19.4	3.0	8.1	-1.2	-1.0	8.9	1.9
25	Metal products	12.9	17.2	19.6	23.4	20.8	21.0	4.2	6.2	-2.5	0.1	8.0	1.3
26	Computer, electronic & optical	19.9	22.8	24.7	26.7	20.1	21.2	2.9	3.8	-6.6	1.1	1.3	-3.5
27	Electrical equipment	17.2	26.2	29.0	25.7	23.2	21.8	8.9	-0.5	-2.5	-1.4	4.6	-7.3
28	Machinery n.e.c.	15.9	16.9	21.0	22.5	19.8	17.4	0.9	5.7	-2.7	-2.5	1.4	-3.7
29	Motor vehicles	8.7	8.1	9.5	19.1	16.2	18.5	-0.6	11.0	-3.0	2.4	9.8	9.1
30	Other transport equipment	9.1	9.7	15.4	11.1	9.3	10.0	0.6	1.4	-1.8	0.7	0.9	-5.3
31	Furniture	9.4	12.2	12.8	19.7	19.2	17.9	2.7	7.5	-0.4	-1.4	8.4	5.1
32	Other manufacturing	16.1	12.4	20.2	26.0	22.4	16.5	-3.7	13.6	-3.6	-5.8	0.4	-3.7
	TOTAL MANUFACTURING	**14.5**	**17.0**	**19.6**	**24.7**	**22.3**	**20.9**	2.5	7.7	-2.4	-1.4	6.5	1.3

(green: above average export share; red: positive pp change)
Note: Confidential trade not allocated.
Source: UN Comtrade.

Table 3 / Share of main trade partners in Austrian exports by 2-digit industry, 2004 and 2015

										Extra-EU detailed:							
		Germany		EU-Rest		CEE-11		Extra-EU		Western Balkans		Russia, Ukraine, Moldova		Turkey		Rest of world	
Sector		2004	2015	2004	2015	2004	2015	2004	2015	2004	2015	2004	2015	2004	2015	2004	2015
10	Food	36.8	39.1	36.1	25.9	13.8	18.3	13.4	16.8	1.5	1.6	2.2	1.4	0.1	0.3	9.5	13.4
11	Beverages	20.7	22.5	33.9	15.2	6.5	7.4	39.1	54.6	0.6	1.6	0.5	0.6	0.8	1.9	37.0	50.7
12	Tobacco	32.9	0.0	37.1	0.0	16.6	0.0	13.3	0.0	1.4	0.0	0.4	0.0	0.5	0.0	11.0	0.0
13	Textiles	28.1	27.7	29.0	18.4	19.9	21.4	23.3	32.6	0.4	2.5	0.8	1.2	2.3	1.4	19.9	27.6
14	Clothing	32.9	32.0	35.0	22.6	17.5	31.9	14.6	13.4	0.1	1.3	1.3	1.9	0.1	0.2	13.1	10.0
15	Leather & footwear	43.4	29.5	13.3	12.2	33.7	42.5	9.9	15.5	0.5	1.3	1.0	1.0	0.7	0.2	7.7	13.1
16	Wood & wood products	22.4	26.8	45.9	34.2	10.0	14.7	21.8	24.4	0.2	0.8	0.8	0.4	0.1	0.4	20.7	22.8
17	Paper	28.3	29.3	37.1	24.9	17.4	22.1	17.2	23.6	0.4	1.0	1.4	1.5	1.2	0.9	14.2	20.3
18	Printing	38.0	61.2	6.9	1.5	31.0	13.9	23.8	23.2	0.0	1.9	4.8	1.0	0.4	0.1	18.6	20.3
19	Refined petroleum	3.8	16.5	2.5	7.9	85.2	64.4	8.7	10.8	0.2	1.0	0.6	0.5	0.2	0.1	7.6	9.2
20	Chemicals	25.8	26.7	25.8	24.5	26.3	23.8	22.1	25.0	0.7	1.6	2.3	1.9	1.3	1.6	17.8	20.0
21	Pharmaceuticals	16.5	10.2	23.4	27.4	13.1	12.7	47.1	49.7	0.3	0.7	8.5	7.3	1.1	0.5	37.3	41.3
22	Rubber & plastics	31.5	34.1	25.7	21.5	24.7	18.8	18.1	25.4	0.5	1.4	1.4	1.1	0.6	0.9	15.8	22.1
23	Non-metallic mineral products	19.4	24.9	22.1	19.7	16.0	15.3	42.3	40.3	0.6	1.3	1.2	1.7	0.5	1.3	40.0	36.0
24	Basic metals	36.5	37.9	31.2	22.0	15.8	17.1	16.6	23.3	0.2	0.6	0.8	0.8	0.8	1.0	14.7	20.9
25	Metal products	37.5	34.2	22.2	19.8	16.8	16.9	23.3	29.1	0.4	0.9	1.8	2.1	0.7	1.1	20.5	25.0
26	Computer, electronic & optical	30.1	22.9	23.0	13.9	20.0	19.0	26.8	44.2	0.4	0.8	3.2	1.0	1.1	0.5	22.1	41.9
27	Electrical equipment	29.5	31.6	22.7	19.3	24.8	17.6	23.1	31.8	0.3	1.1	2.3	1.3	1.6	1.7	18.9	27.7
28	Machinery n.e.c.	27.2	26.6	22.3	18.3	15.7	12.3	35.2	42.7	0.3	0.6	3.6	2.7	1.4	1.8	29.9	37.6
29	Motor vehicles	38.5	40.7	24.9	17.2	8.4	17.1	28.3	25.2	0.1	0.4	0.6	0.7	0.4	0.4	27.2	23.7
30	Other transport equipment	40.0	27.1	22.4	20.7	14.2	8.2	23.5	43.9	0.1	0.1	0.2	1.3	0.8	0.3	22.4	42.1
31	Furniture	41.4	39.0	27.3	15.9	11.2	16.0	20.1	28.9	0.1	0.6	1.2	0.9	0.3	0.4	18.6	27.1
32	Other manufacuring	24.5	24.8	26.1	27.3	13.8	13.9	35.7	34.2	0.2	0.9	5.7	1.3	0.5	0.5	29.3	31.6
	TOTAL MANUFACTURING	**31.5**	**29.8**	**26.4**	**20.7**	**16.4**	**17.3**	**25.9**	**32.2**	**0.3**	**0.9**	**2.0**	**1.8**	**0.9**	**0.9**	**22.7**	**28.6**

(red: export share larger than 25%)

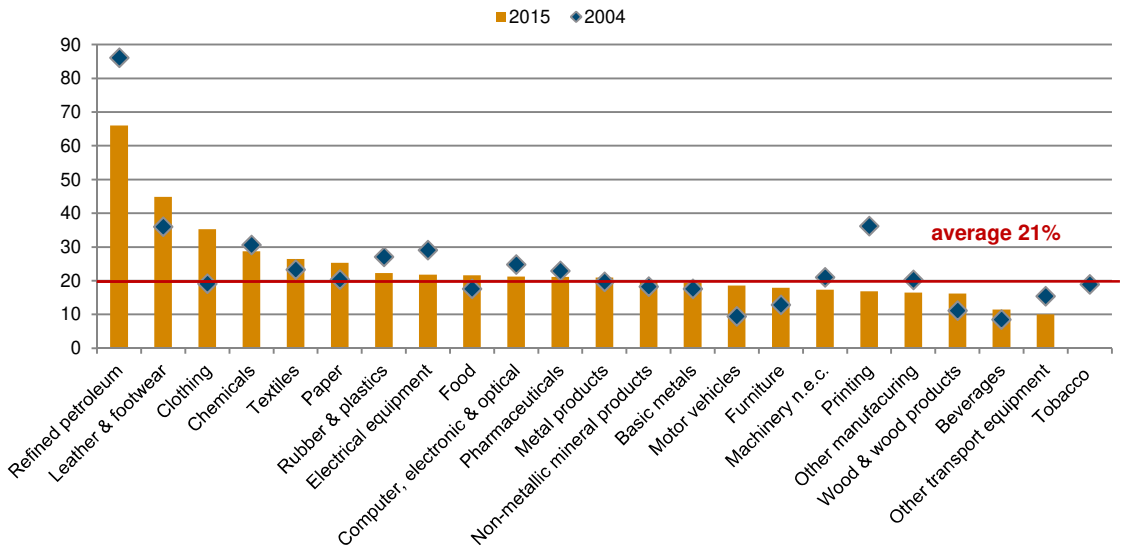
Note: Confidential trade not allocated. Source: UN Comtrade.

As eleven countries of the CESEE-20 are members of the EU and most of them joined the EU in 2004, we now focus on the year 2004 in comparison to the year 2015 (see Figure 8). This gives some long-term trend, but ignores changes in between.

In 2015, an average of 21% of Austrian manufacturing products were exported to the CESEE-20 region. Which of the Austrian export sectors are more directed towards the CESEE region (see Figure 8)? A far higher share was found in: refined petroleum products (66%), leather and footwear (45%), clothing (35%), chemicals (29%), textiles (27%) and paper (25%). Still higher than the average are exports of: rubber & plastic, electrical equipment, food, computer electronic & optical products, pharmaceuticals and metal products. At the bottom were exports of beverages and other transport equipment (10%).

Between 2004 and 2015, the shares going to the CESEE-20 increased on average by 1.6 percentage points. The largest increases were recorded for: Clothing, motor vehicles and leather & footwear. Wood & wood products, furniture as well as paper also increased relatively more (5pp). Otherwise, export shares declined most for refined petroleum products, printing and tobacco (ceased production).

Figure 8 / CESEE-20 export shares by industry, 2004 and 2015, ranked by 2015 share



Note: Confidential trade not allocated.
Source: UN Comtrade.

Looking now into more details of Austrian trade partners in 2004 and 2015, Table 2 shows the export shares going to Austria's main trade partner regions: Germany, the Rest-EU, the CEE-11 and extra-EU partners. Extra-EU is detailed for the Western Balkans, Russia, Ukraine, Moldova and Turkey (together with the CEE-11 this again reflects the CESEE-20) and the rest of the world.

In 2015, Germany was still the main trade partner in most of the industries for Austria while the share of exports going to the extra-EU was also quite high in most industries. Industries with export shares larger than 25% (in red) numbered only four industries for the EU-Rest and three industries for CEE-11. A large share of pharmaceutical exports went to the Russian, Ukrainian and Moldovan markets.

Between 2004 and 2015, there was clearly a shift of export shares from the EU-Rest towards the extra-EU countries. In the CEE-11 and Germany, some industries saw rising export shares, some declining. The export share going to the Western Balkan countries increased in all industries, those to Turkey in the majority of sectors, those to Russia, Ukraine and Moldova in a number of industries (however strongly influenced by 2015 data and decline).

Developments might differ on an industry by industry basis. For Austria's main export industries – machinery and transport equipment – the following can be summarised:

› For Austria's largest export industry – *machinery n.e.c.* – exports heading to extra-EU countries increased by 7.5pp and now account for 43% of total Austrian exports in this category. Shares to Germany, Rest-EU and CEE-11 all declined. Still Germany accounts for 27% of exports, Rest-EU for 18% and CEE-11 for 12%.

› For Austria's second largest export industry – *the transport equipment sector* – 41% of exports go to Germany and this share even increased between 2004 and 2015. Exports to CEE-11 surged by nearly 9pp to 17% of Austrian exports in this category. The export share to the Rest of the EU declined (to a share of 17%) as did that to extra-EU markets (to a share of 25% in 2015).

Summarising, the Austrian total world market share peaked in 2004 but declined since then. This trend is also reflected in all industries at the 2-digit level, except for pharmaceuticals and chemicals. The share of CESEE-20 in Austrian exports increased both before and after accession to the EU in 2004 and peaked in 2008. During the crisis years, this share declined and remained rather flat thereafter. Between 2004 and 2015, rather a strong decline of Austria's exports to the 'old' EU Member States can be seen and a strong increase of exports going to extra-EU markets. Thus, it seems that Austria is not subject to a lock-in effect in the CESEE markets, on the contrary, these results would suggest a growing internationalisation of the Austrian export structure.

Analysis on a more detailed 3-digit level provides deeper insights on exports heading to the CESEE region (data can be found in the Annex). Most interestingly, major export products going towards the CESEE region in 2015 were pharmaceuticals (Russian markets), motor vehicles, basic iron & steel and parts & accessories for motor vehicles. In 2004, major export products were other special-purpose machinery, motor vehicles, other general purpose-machinery and pharmaceutical preparations. Thus, while machinery exports lost some places in the ranking, pharmaceuticals, basic iron & steel and parts & accessories for motor vehicles gained some places.

This section analysed the export side of Austrian trade only. However, due to increasing fragmentation of production, imports of intermediate products also play a major role in the production processes. In the next section, this fact is taken into account and analysis is done with the help of input-output tables using an extended WIOD-database developed by wiiw.

4. Austrian trade in value added and linkages with CESEE

Globalisation has led to the fragmentation of production processes around the world, creating global linkages and a high share of imported intermediates. Together with the availability of new databases, this has led to new research based on the analysis of value chains and value added trade (see for instance Stehrer and Stöllinger, 2013).

Previous work has been done using the World Input-Output Database (WIOD) which provides time-series of world input-output tables, covering 40 countries, including 27 members of the EU and 13 other major economies (Australia, Brazil, Canada, China, India, Indonesia, Japan, Mexico, Russia, South Korea, Taiwan, Turkey and the USA). It covers 35 industries at the two-digit ISIC Rev. 3 level for the years 1995 to 2011 (an update until 2014 has been available since November 2016). Sectors include all industries of an economy – from agriculture, mining, 14 manufacturing industries, utilities, construction, market services and non-market services. On the basis of the WIOD database a new set of indicators can be calculated.

A new world-input-output database has been recently completed at the wiiw. The database resulted from an effort to provide data for a larger set of countries than so far available in the WIOD. This new wiiw-database is called the 'wiiw Wider Europe Multi-Country Input-Output Database'. It contains 50 countries and 32 industries and covers the period 2005-2014. This effort was aimed in particular at including all European countries in order to be able to capture production linkages between all countries of the continent. Thus, all EU-28 countries together with non-EU European countries, Iceland, Norway, Switzerland, five Western Balkan Countries (Albania, Bosnia and Herzegovina, Montenegro, Macedonia and Serbia), Russia, Turkey and Ukraine are included.[3]

The analysis in this chapter is based on this new 'wiiw Wider Europe Multi-Country Input-Output Database'. Particular focus is again put on highlighting the importance of the CESEE region (now comprising 19 countries, Moldova not included). The additional countries included in this new database are of major interest for Austria, and thus new data will provide new insights into Austria's competitiveness and the role of CESEE. In addition, the analysis will cover not only manufacturing, but also agriculture, mining and several services sectors (but exclude public services), thus encompassing the total business economy.

Thus, the analysis will first focus on simple indicators, looking at the input structure of Austrian industries as well as its output structure and the role CESEE has played over time (2005 vs 2014). We will then refine gross exports and conduct a decomposition analysis: gross exports are split up into foreign value added content of gross exports and a domestic value added content (also denoted as value added exports).

[3] For details on this new database and its construction see Reiter and Stehrer (2018). Results presented in this section might differ from previous results based on WIOD-data due to differences in database construction.

The input structure of Austrian industries is depicted in Figure 9. The columns of the extended-WIOD contain information on the production processes. Calculated as shares of gross output, we obtain the input structure of a sector distinguishing between intermediate inputs and value added (see Panel A). As a specific feature of WIOD, we can differentiate between domestic and foreign intermediate inputs (see Panel B). In addition, the role of CESEE is highlighted and depicted as a share of foreign inputs (see Panel C).

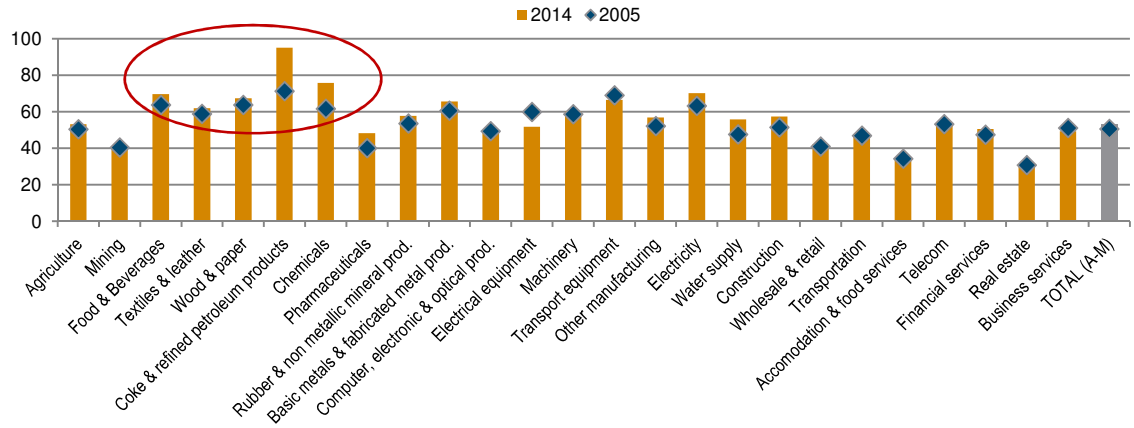
Generally, manufacturing industries need more intermediate inputs and thus the share of intermediates in output is high, while it is smaller in service industries. On average for all industries (A-M, from Agriculture to Business services), the share of intermediate inputs in gross output stood at 53% in 2014 (thus value added was 47%). The share of intermediates ranged between 50% and 95% for manufacturing industries in 2014. The lowest shares (conversely the highest shares of value added) were found in: pharmaceuticals, computer, electronic and optical products and electrical equipment. The highest shares for intermediates were found in industries with high resource inputs: coke & refined petroleum products, chemicals and wood & paper. The transport sector required about 66% of intermediates. Between 2005 and 2014, the share of intermediates increased from 51% to 53% on average and it increased in almost all industries (strongest in coke & refined petroleum products, chemicals). There were only a few exceptions (electrical equipment and transport equipment, which means an increase in the value added share here).

Looking into more details of intermediates, we can distinguish between domestic and foreign intermediate inputs. In 2014, foreign inputs accounted for an average of 31% of all intermediate inputs (domestic ones thus for 69%). The share of foreign inputs ranged between 30% and 84% in manufacturing industries. Those industries which had the lowest shares, source domestically, i.e. the food industry and wood & paper. Industries which sourced more than 50% of their intermediates abroad were: computer, electronic & optical products, textiles, electrical equipment, transport equipment, and especially, chemicals and coke & refined petroleum products. Between 2005 and 2014, the share of foreign intermediates again increased from 28% to 31% on average and in almost all industries.

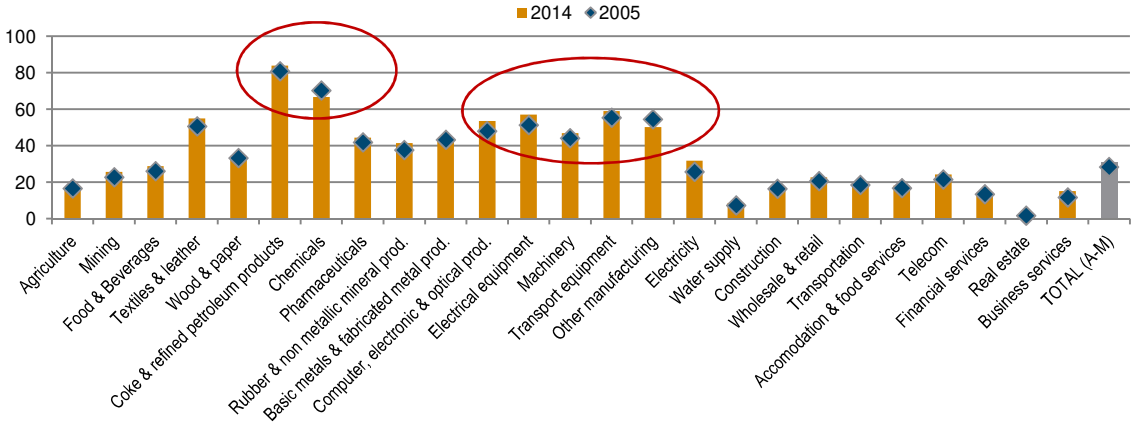
Zooming in now to the importance of inputs coming from the CESEE countries, the share of inputs from the CESEE region in total foreign inputs is depicted. The share reached 22% on average in 2014 and ranged between 10% (in pharmaceuticals) to 41%. Those industries especially requiring raw materials source more inputs from the CESEE region: coke & refined petroleum products, wood & paper and basic metals. Also mining and electricity stand out. In addition, some service industries also source relatively more from the CESEE region. Between 2005 and 2014, the importance of CESEE inputs increased from 21.4% to 21.8% on average and for almost all industries.

Figure 9 / Direct input structure of the Austrian economy, 2005 and 2014

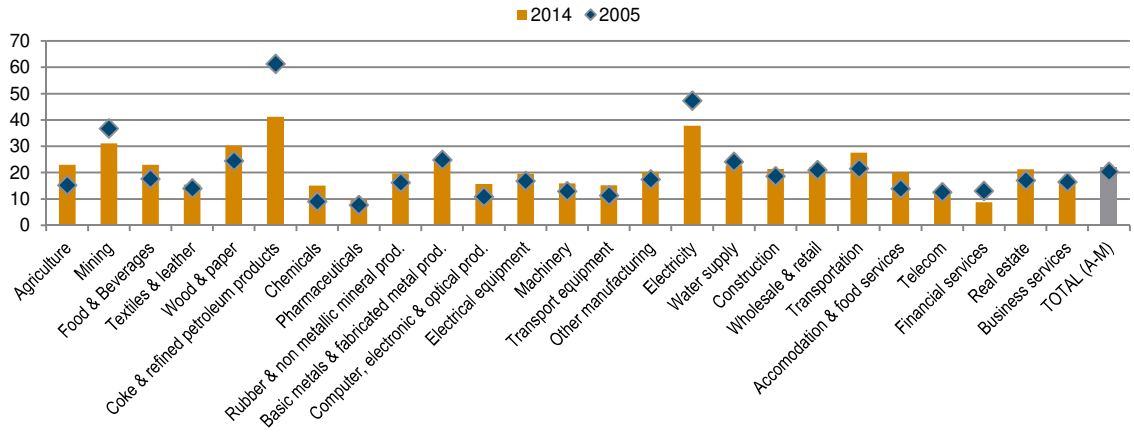
A. Austria: Shares of intermediates in gross output, in %



B. Austria: Shares of foreign intermediates in total intermediates, in %



C. Austria: Shares of CESEE intermediates in foreign intermediates, in %



Note: CESEE-19 (not including Moldova), Total A-M includes all industries from Agriculture (A) to Business services (M).
Source: wiiw Wider Europe Multi-Country Input-Output Database.

Next, the output structure of Austrian sectors is depicted in the subsequent figures (Figures 10 and 11, Panels A-C). The rows of the extended WIOD contain information where output is supplied either as intermediates to other industries or as final products consumed by households, governments or firms (stocks and gross fixed capital formation). Thus, we will look at the sales structure by sector and distinguish between domestic and foreign intermediate consumption/sales, as well as domestic and foreign consumption/sales of final products.

Figure 10 shows the role of intermediate sales in the output structure of Austrian industries in more detail. In Panel A, the share of intermediate consumption in total output is presented. On average, 55% of output is consumed as intermediates while 45% goes to final demand (2014). Some industries supply more intermediates which are then processed in other industries. These sectors include wood & paper, chemicals, rubber & plastic products and non-metallic mineral products or basic metals & fabricated metal products, where 80% of output is used as intermediates. On the other hand, computer, electronic & optical products, electrical equipment, machinery, transport equipment and other manufacturing record a share of 40% of intermediate use (thus 60% goes to final demand). Between 2005 and 2014, the share of intermediates slightly increased on average (52% to 55%) and across most industries.

Panel B shows the share of foreign intermediate consumption (intermediate exports) in total intermediate consumption (intermediate sales). On average, 30% of intermediates were exported abroad, while 70% were consumed domestically in 2014. A higher share of intermediates exported can be found in a range of sectors: Above 60% for chemicals, computer, electronic & optical products, electrical equipment, machinery and transport equipment. Between 2005 and 2014, the share of intermediate exports increased on average (28% to 30%) and across all industries.

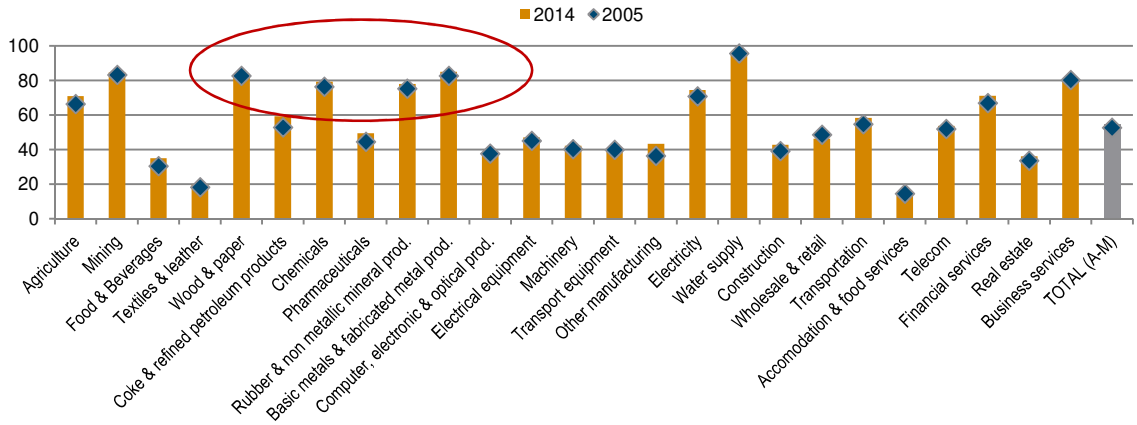
Panel C depicts the share of intermediates going to the CESEE region as a share of foreign intermediate consumption. On average, 16% of foreign intermediates went to the CESEE region in 2014. This share was much higher for textiles & leather products and coke & refined petroleum products. Between 2005 and 2014, the share only slightly increased on average (from 15.8% to 16.4%), however the share decreased in all services sectors and in some manufacturing industries. The largest increases on the other hand were found in textiles & leather, transport equipment and wood & paper.

In a next step, Figure 11 exhibits the role of final demand (made up of household consumption, consumption of non-profit organisations serving households and governments, gross capital formation, inventories) in the output structure of Austrian industries. On average, 45% of Austrian output went to final demand in 2014. In some industries this share was higher: it is highest for textiles & leather with 80%, followed by food & beverages. In the following industries about 60% went into final demand: computer, electronic & optical products, electrical equipment, machinery, transport equipment and other manufacturing. Between 2005 and 2014, the share of final demand slightly decreased on average (47% to 45%) and across all industries.

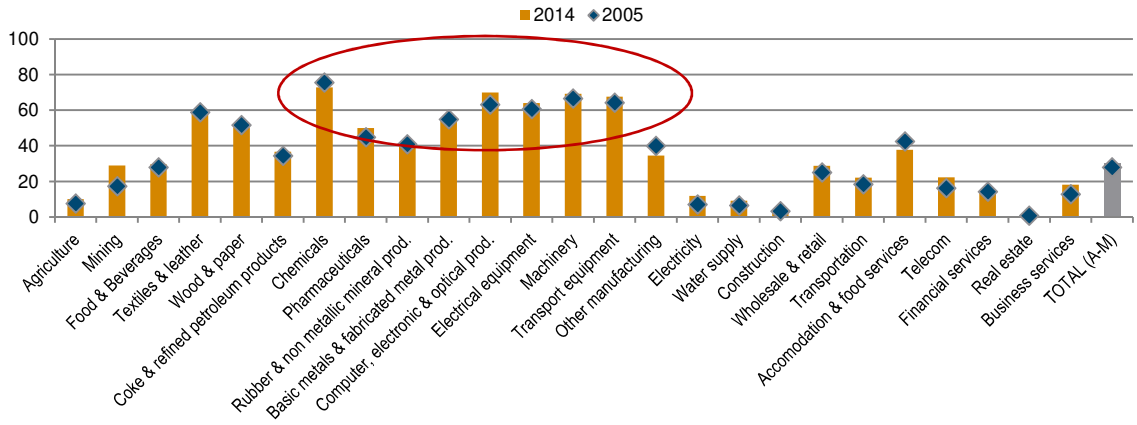
Output of Austrian industries goes to domestic and foreign final demand. Panel B shows the share supplied to foreign final demand (final exports). Final exports accounted for 21% on average of total final demand, while 79% was absorbed by domestic final demand. A higher share going abroad can be seen in all manufacturing industries, except wood & paper and coke & refined petroleum products. Between 2005 and 2014, the share of final exports increased on average (18% to 21%) and across all industries.

Figure 10 / Output structure of the Austrian economy (1), 2005 and 2014

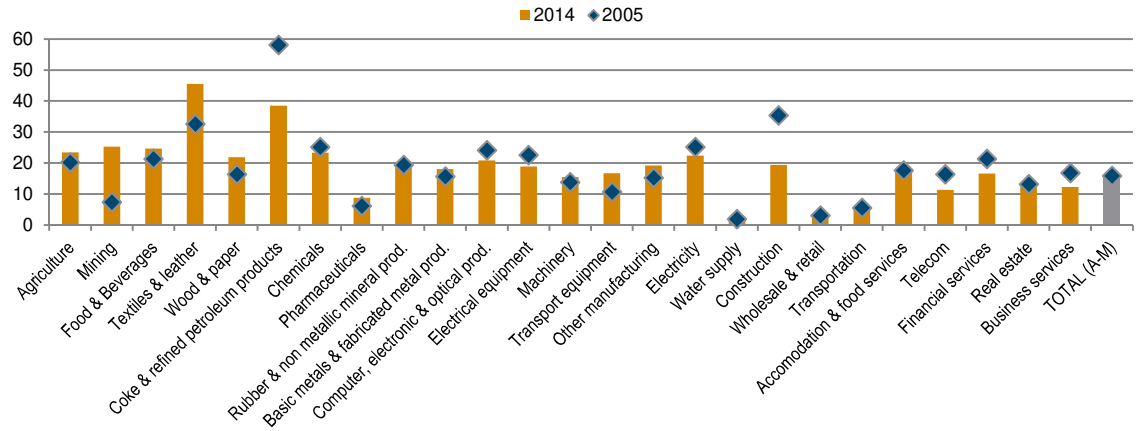
A. Austria: Shares of intermediate consumption in total output, in %



B. Austria: Shares of foreign intermediates in total intermediate consumption, in %



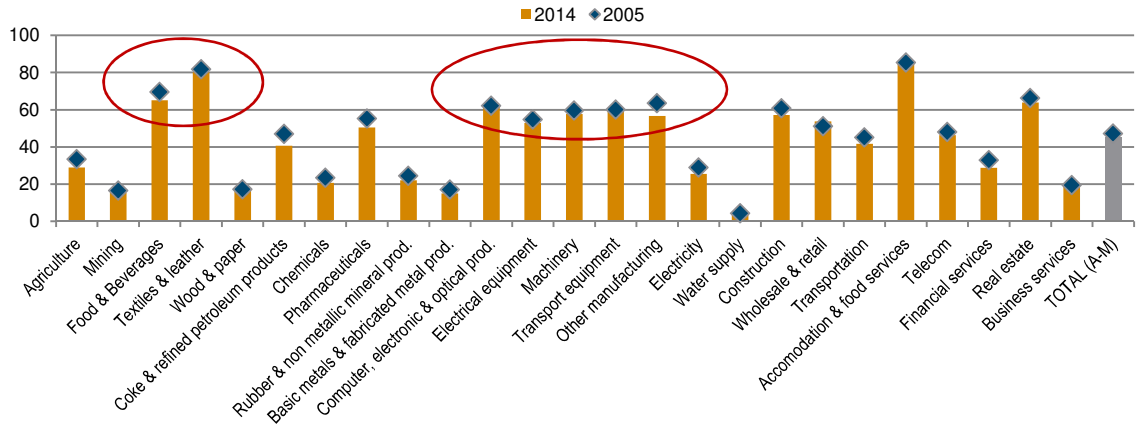
C. Austria: Shares of CESEE intermediate consumption in foreign intermediate consumption, in %



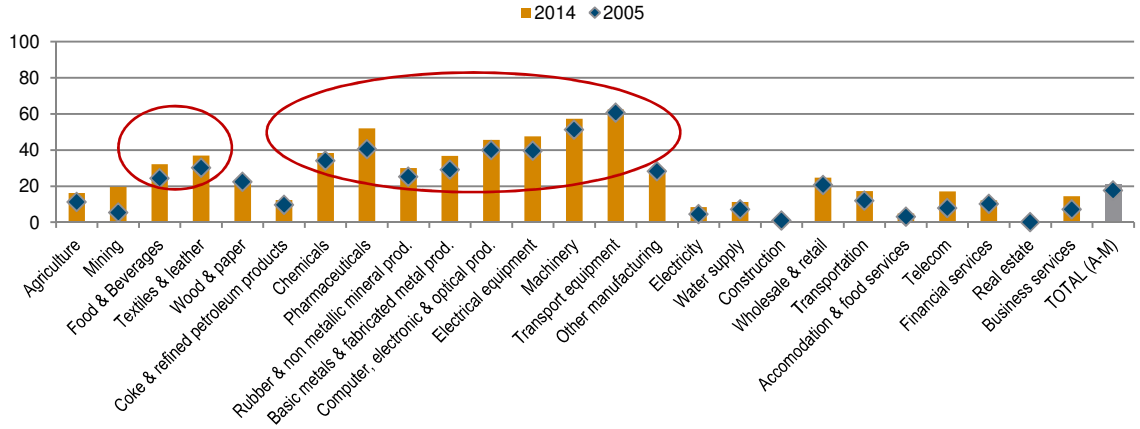
Note: CESEE-19 (not including Moldova), Total A-M includes all industries from Agriculture (A) to Business services (M).
Source: wiiw Wider Europe Multi-Country Input-Output Database.

Figure 11 / Output structure of the Austrian economy (2), 2005 and 2014

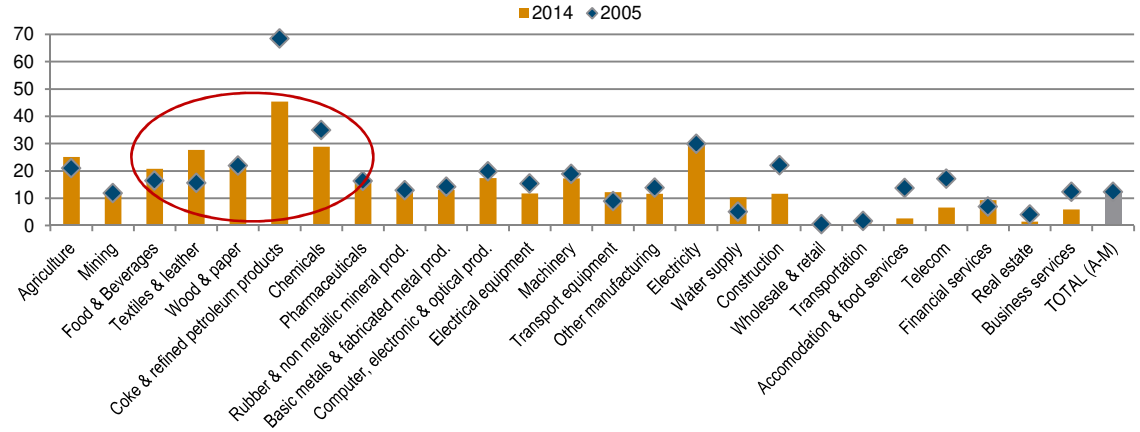
A. Austria: Shares of final demand in total output, in %



B. Austria: Shares of foreign final demand in total final demand, in %



C. Austria: Shares of CESEE final demand in foreign final demand, in %

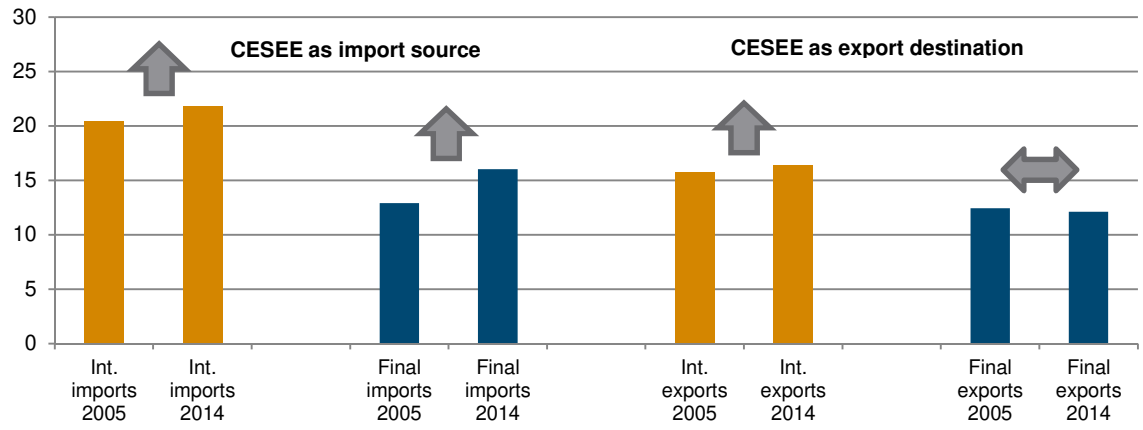


Note: CESEE-19 (not including Moldova), Total A-M includes all industries from Agriculture (A) to Business services (M).
Source: wiiw Wider Europe Multi-Country Input-Output Database.

Panel C depicts the share of final exports going to the CESEE region as a share of total foreign final demand. On average, 12% of final exports went to the CESEE region in 2014. This share was much higher for food & beverages, textiles & leather products, wood & paper, coke & refined petroleum products and chemicals. Between 2005 and 2014, however, the share slightly decreased on average (from 12.4% to 12.1%). The share decreased for most industries, except food & beverages, textiles & leather, wood & paper, pharmaceuticals and transport equipment.

Summing up the role of CESEE for the Austrian economy we find that for the Austrian economy on average (sectors A-M), intermediate imports and exports play a greater role than final imports and exports. Overall, CESEE are an important source of imports, accounting for 22% of foreign intermediate imports and 16% of foreign final imports. As an export destination, intermediates also account for 16% of foreign intermediate exports and 12% of final goods exports (see Figure 12). Changes between 2005 and 2014 were rather small; the percentage point change was largest for final imports from CESEE, while final exports to CESEE remained almost the same. Intermediate imports from CESEE and exports to CESEE slightly increased.

Figure 12 / Overview: Role of CESEE for the Austrian economy (A-M), in %



Source: wiiw Wider Europe Multi-Country Input-Output Database.

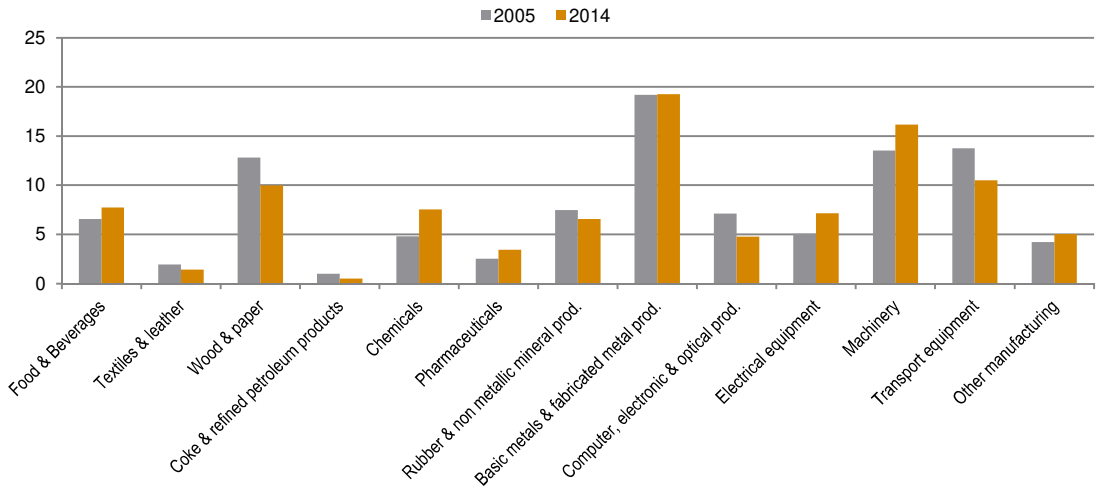
Having looked at the direct input and output structure of the Austrian economy, we now include indirect effects in our analysis. Indirect effects are so-called second-round effects e.g. transport equipment sector sources inputs from the rubber & plastic products sector (direct effect), which then sources inputs from the chemicals sector (second-round effect) and so on. There are a number of indicators which include these indirect effects. Focusing particularly on the role of trade and value added trade, we decompose gross exports into domestic value added and the foreign value added content of trade. Both components are of particular importance: The first part shows the domestic value added exports (VAX), while the second part shows the integration into production networks, i.e. the amount of vertical specialisation (VS). Based on the decomposition proposed by Wand, Wei & Zhu (2013), we calculate both indicators for the Austrian economy focusing now on the manufacturing industry only. Using the new wiiw database gives us some interesting findings.

Figure 13 shows the structure of value added exports of Austrian manufacturing. Keeping in mind that industries are less-disaggregated compared to the previous chapter (and Figure 4), we find that the

basic metals & fabricated metal sector exhibits the largest share of value added exports (19%), followed by machinery (16%), transport equipment (11%) and wood & paper (10%).

Between 2005 and 2014, there was a shift towards machinery, electrical equipment and chemicals, which exhibited the largest increases in shares of value added exports on the one hand. On the other, there was a shift away from transport equipment, computer, electronic & optical products and wood & paper, which saw the largest declines in their shares.

Figure 13 / Structure of value added exports of Austrian manufacturing, 2005 and 2014, in %

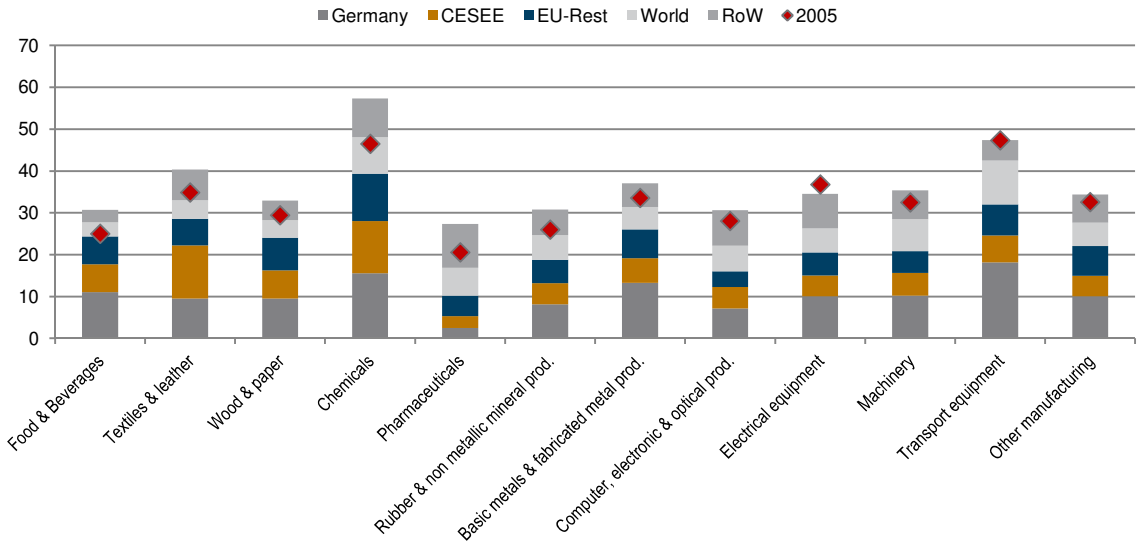


Source: wiiw Wider Europe Multi-Country Input-Output Database.

Figure 14 depicts the second component of gross exports, i.e. the foreign value added content of trade. In all manufacturing industries the foreign value added content plays a non-negligible role. The highest content (about 80%) can be found in the coke & refined petroleum products sector, in chemicals (nearly 60%) and also in the transport equipment sector (close to 50%). In the other sectors, the foreign value added share ranges between 30% and 40%. Between 2005 and 2014, this share increased in all sectors, except in electrical equipment.

Figure 14 also shows the origin of foreign value added by countries and country groups. Germany, as the main trading partner, is exhibited separately. CESEE value added plays a major role in coke & refined petroleum products, textiles & leather and the chemicals sectors.

Figure 14 / Foreign value added content of Austrian gross exports (VS as % of gross exports), 2014 and 2005



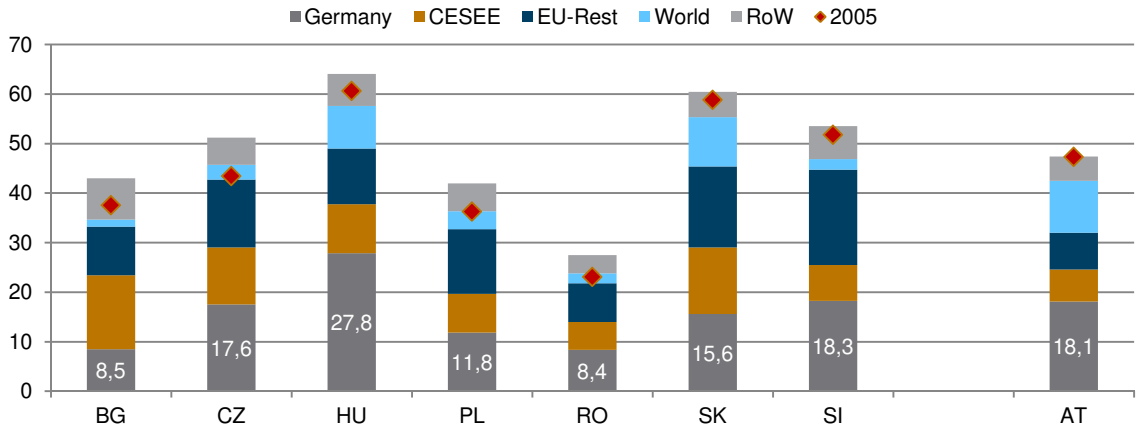
Note: Coke & refined petroleum products not reported. World denotes rest of countries specified in the Database, whereas RoW denotes 'Rest of the Wold' which is not specified in the Database.
Source: wiiw Wider Europe Multi-Country Input-Output Database.

5. Germany, Austria and the transport equipment sector

As has been shown in the previous chapters, Germany has traditionally been Austria's main trading partner, both in terms of exports and imports, and is thus of high importance for Austria. The opening up of the former centrally planned economies and their entries to the EU has shifted trade patterns not only for Austria but also for Germany. Germany's links to the Central and Eastern European countries have grown since the mid-1990s and a 'German-Central European Supply-Chain' (see IMF, 2013), has evolved, including Poland, Slovakia, Hungary and the Czech Republic. Austria was not particularly mentioned in this report but it also belongs to this German-CEE supply chain. It can also be termed 'Central European Manufacturing Core', encompassing Germany, Austria, the Czech Republic, Slovakia, Hungary and Poland (see Stehrer and Stöllinger, 2015). How has the integration of the new Member States affected Austria's participation in the German supply chains? Has its position changed or was it even replaced by the NMS? Often, the automotive industry has been cited as a prominent example of the integration and building of this German-CEE supply chain (see IMF, 2013 and Timmer et al., 2015). Thus, we will look at this sector in more detail.

Figure 15 exhibits the significance of German value added in transport equipment exports of Austrian and CEE economies, reflecting the importance of German intermediate inputs into this sector. In effect, this share was highest in Hungary (28%), the Czech Republic, Slovakia and Slovenia (about 18%). Also, in Austria, this share reached 18% in 2014. The share was very low for Bulgaria and Romania (only about 8%).

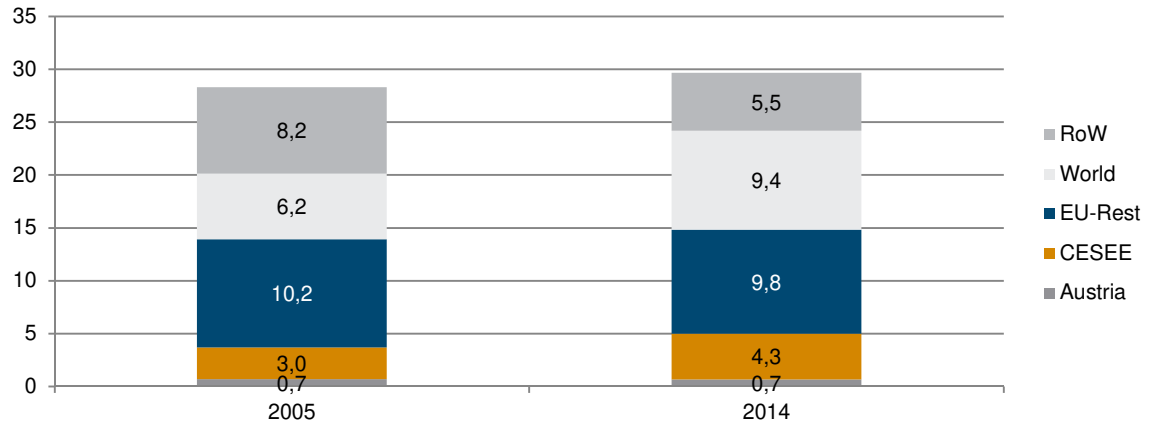
Figure 15 / Foreign value added content of transport equipment exports, 2014 and 2005, in % of gross exports



Note: World denotes rest of countries specified in the Database, whereas RoW denotes 'Rest of the Wold' which is not specified in the Database.
Source: wiiw Wider Europe Multi-Country Input-Output Database.

Figure 16 now looks at the German transport equipment sector and foreign value added embedded in German gross exports. We see a small and stable share for Austrian value added, and a growing share for the CESEE region. Overall, Germany has a far larger share of domestic valued added while the share of foreign value added only reached about 30% in 2014 but has also been growing over time.

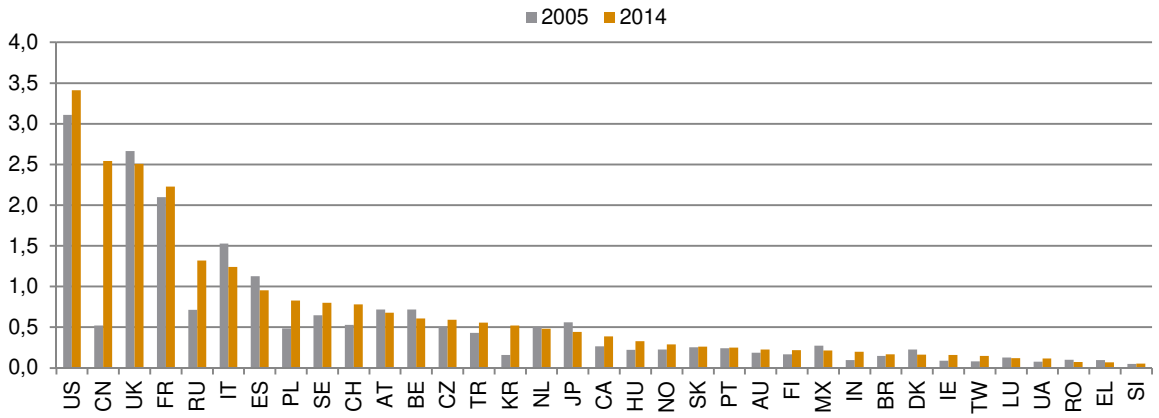
Figure 16 / Foreign value added content of German transport equipment exports, 2014 and 2005, in % of gross exports



Note: World denotes rest of countries specified in the Database, whereas RoW denotes 'Rest of the Wold' which is not specified in the Database.
Source: wiiw Wider Europe Multi-Country Input-Output Database.

It is interesting to look at this shift at the country level (see Figure 17). In particular, within the CESEE region, Russia, Poland and the Czech Republic show large shares of value added in Germany's transport equipment exports. Within the European Union, value added of Great Britain, France, Italy and Spain takes a major share. From extra-EU, the USA and especially China – which saw the largest surge between 2005 and 2014 – are of major importance.

Figure 17 / Foreign value added content of German transport equipment exports, country level 2014 and 2005, in % of gross exports



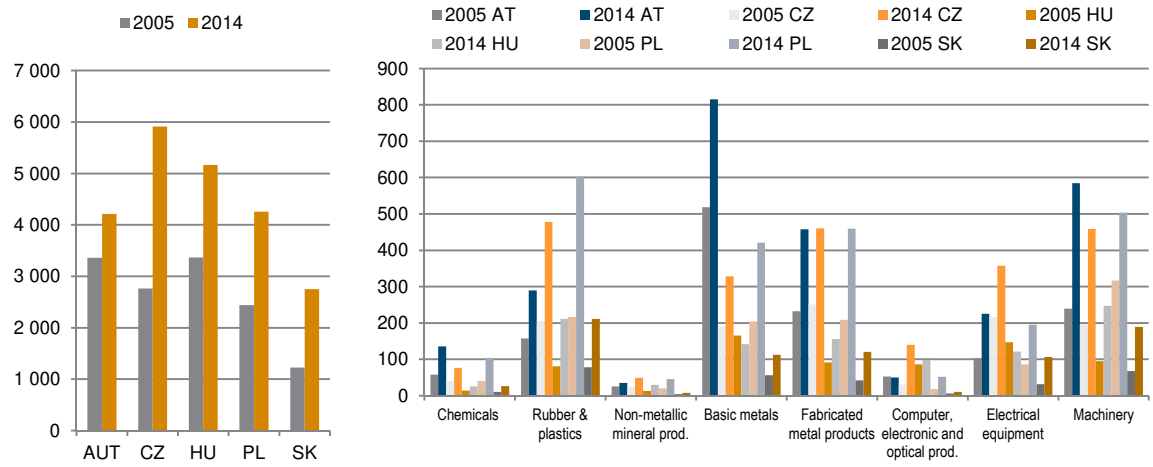
Note: Rest of the world not reported.
Source: wiiw Wider Europe Multi-Country Input-Output Database.

Value added incorporated in exports is generated throughout all sectors of the economy. Within the transport equipment sector not only do inputs from the transport equipment sector play a major role, but inputs from textiles, chemicals, rubber & plastic products, metals, electrical equipment and machinery also do. Thus, looking only at trade data for car parts and accessories trade between Germany, Austria and the CESEE might not yield the full picture of linkages prevalent in the transport equipment sector.

A brief look at the input structure of the German motor vehicle industry (see Figure 18) shows that Germany's input structure has shifted towards the four manufacturing core CEE countries (the Czech Republic, Hungary, Poland and Slovakia) in terms of inputs from the motor vehicle industry itself (car parts and accessories), although inputs from Austria have also increased (Figure 18, left panel). However, for some additional inputs, Austria has kept its major role (Figure 18, right panel): chemicals, basic metals, fabricated metal products, electrical equipment (after the Czech Republic) and machinery. The CE-core countries are major suppliers of rubber & plastic products (shift of tyre production towards the CESEE region, although inputs from Austria also increased here). Inputs from the Czech Republic and Poland are of particular importance in many fields (fabricated metal products, electrical equipment and machinery).

Figure 18 / Input structure of the German motor vehicle sector (NACE Rev. 2, C28), 2005 and 2014, USD million

A. C28 Motor vehicle inputs **B. Inputs from other manufacturing sectors**



Source: WIOD.

Previous findings (Hanzl-Weiss, 2016 and Kumer et al., 2015) have shown that the accession to the European Union and the integration of the CEE countries into the German supply chains did not harm Austria's role in Germany's supply chains. The analysis above supports these findings and reveals that Austria has remained an important supplier to Germany's transport equipment sector not only in the main input sector (motor vehicle parts) but also in other input supplying industries.

6. Summary

Overall, there was concern that Austria's economic competitiveness had deteriorated in the past. This was evidenced by the fact that Austria has lost global export market shares since the Eastern Enlargement of the EU in 2004 and underlined by recent research (Fenz et al., 2015) that stressed the fact that the Austrian economy has lost out in terms of goods exports shares to Germany over the last couple of years and these were replaced by higher shares of exports to the countries of Central, East and Southeast Europe (CESEE). In-depth analysis of various indicators of external competitiveness show the following results:

Bilateral trade between Austria and its neighbouring countries, the Czech Republic, Hungary and Slovakia, has expanded rapidly between 1995 and 2017, with some widening of trade balances since 2011. Austria – due to the closeness of Vienna's Schwechat airport to Bratislava – has emerged as a trading hub for Slovakia. Comext trade data (which include the Rotterdam effect and thus inflate trade coming from extra-EU sources) expand trade between Austria and Slovakia through the inclusion of quasi-transit trade. Bilateral trade data here overestimate Austria's role in trade with Slovakia (and vice versa).

Analysis based on UN Comtrade data exhibits that Austrian world market share peaked in 2004 but has declined since then. This trend is also reflected in all industries at the 2-digit level, except for pharmaceuticals and chemicals. A number of industries show a revealed comparative advantage, the largest seen by the wood industry, paper, beverages and metal product sectors. The Austrian export structure exhibits moderate changes between 1995 and 2015 with machinery and motor vehicles remaining the most important Austrian export sectors. Still important export industries are also: basic metals, electrical equipment, computer, electronic & optical products, pharmaceuticals, metal products and food.

Trends in the analyses of major Austrian manufacturing trade partners are quite interesting and reveal different patterns: Over the long run – between 1995 and 2015 – there was a major decline of export shares going to Germany as well as those going to the rest of the EU on the one hand. On the other, the share of exports going to the new EU Member States (CEE-11) increased, as well as exports to extra-EU destinations. However, shifts away from Germany and towards the CEE region had already occurred before EU accession – between the period 1995 and 2004 – while the comparison between the years 2004 and 2015 shows only moderate shifts. On the other hand, between 2004 and 2015 large shifts can be observed away from the old EU Member States towards extra-EU Member States (likely to be also a crisis effect). This would lead to the conclusion that Austria is not subject to a lock-in effect into CESEE markets, on the contrary, these results would suggest a growing internationalisation of the Austrian export structure. Still it should be mentioned that Germany kept its important role as Austria's major trade partner.

On the 2-digit industry level, Austrian export focus towards the CESEE is strongest in some smaller Austrian export sectors (e.g. refined petroleum products, leather, clothing), while the two major Austrian

export sectors – machinery and transport equipment sector – show a below average share of exports to the CESEE region. In fact, machinery exports are heading towards extra-EU markets and transport equipment exports towards Germany, However, in the latter sector, the CESEE region gained in importance. On a 3-digit industry level, major export products towards the CESEE region are pharmaceuticals (Russian markets), motor vehicles, basic iron & steel and parts & accessories for motor vehicles.

Detailed analysis of the Austrian input and output structure reveals that CESEE is most important for Austrian intermediate goods trade and is most pronounced for intermediate imports. The share of final goods imports from CESEE increased most between 2005 and 2014, while the share of final goods exports heading to the region stagnated.

Germany has traditionally been Austria's main trading partner, both in terms of exports and imports, and is thus of high importance for Austria. Germany links itself to the Central and Eastern European countries that have grown since the mid-1990s and together with, Austria, the Czech Republic, Slovakia, Hungary and Poland it now forms the 'Central European Manufacturing Core' (Stehrer and Stöllinger, 2015). Results for the transport equipment sector reveal that accession to the European Union and the integration of CEE into the German supply chains did not harm Austria's role in Germany's supply chains and that Austria has remained an important supplier to Germany's transport equipment sector.

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Annex

OVERVIEW: AUSTRIAN TRADE WITH CESEE-20 ON THE 3-DIGIT LEVEL

Annex Table 1 / 15 main Austrian exports to CESEE-20, 2004 and 2015

2004			USD mn	2015			USD mn
1	289	Manufacture of other special-purpose machinery	1190	1	212	Manufacture of pharmaceutical preparations	1910
2	291	Manufacture of motor vehicles	771	2	291	Manufacture of motor vehicles	1650
3	282	Manufacture of other general-purpose machinery	769	3	241	Manufacture of basic iron and steel and of ferro-alloys	1140
4	212	Manufacture of pharmaceutical preparations	754	4	293	Manufacture of parts and accessories for motor vehicles	1130
5	222	Manufacture of plastics products	688	5	289	Manufacture of other special-purpose machinery	1060
6	271	Manufacture of electric motors, generators, transformers and electricity distribution and control apparatus	662	6	271	Manufacture of electric motors, generators, transformers and electricity distribution and control apparatus	985
7	303	Manufacture of air and spacecraft and related machinery	645	7	281	Manufacture of general-purpose machinery	955
8	293	Manufacture of parts and accessories for motor vehicles	633	8	282	Manufacture of other general-purpose machinery	949
9	281	Manufacture of general-purpose machinery	632	9	192	Manufacture of refined petroleum products	948
10	273	Manufacture of wiring and wiring devices	582	10	222	Manufacture of plastics products	918
11	261	Manufacture of electronic components and boards	554	11	263	Manufacture of communication equipment	914
12	192	Manufacture of refined petroleum products	546	12	201	Manufacture of basic chemicals, fertilisers and nitrogen compounds, plastics and synthetic rubber in primary forms	770
13	171	Manufacture of pulp, paper and paperboard	525	13	171	Manufacture of pulp, paper and paperboard	727
14	241	Manufacture of basic iron and steel and of ferro-alloys	520	14	141	Manufacture of wearing apparel, except fur apparel	707
15	279	Manufacture of other electrical equipment	484	15	257	Manufacture of cutlery, tools and general hardware	702

Note: Confidential trade not allocated.
Source: UN Comtrade.

Annex Table 2 / Exports with largest share going to CESEE-20, 2004 and 2015

Smallest share			in %	Largest share			in %
1	192	Manufacture of refined petroleum products	86.3	1	151	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery and harness; dressing and dyeing of fur	67.2
2	191	Manufacture of coke oven products	74.6	2	192	Manufacture of refined petroleum products	66.8
3	233	Manufacture of clay building materials	69.6	3	235	Manufacture of cement, lime and plaster	56.4
4	151	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery and harness; dressing and dyeing of fur	60.2	4	253	Manufacture of steam generators, except central heating hot water boilers	51.5
5	203	Manufacture of paints, varnishes and similar coatings, printing ink and mastics	48.1	5	292	Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers	48.4
6	264	Manufacture of consumer electronics	47.6	6	204	Manufacture of soap and detergents, cleaning and polishing preparations, perfumes and toilet preparations	44.7
7	324	Manufacture of games and toys	46.9	7	203	Manufacture of paints, varnishes and similar coatings, printing ink and mastics	44.1
8	102	Processing and preserving of fish, crustaceans and molluscs	44.3	8	263	Manufacture of communication equipment	39.4
9	235	Manufacture of cement, lime and plaster	43.8	9	233	Manufacture of clay building materials	37.8
10	273	Manufacture of wiring and wiring devices	43.4	10	324	Manufacture of games and toys	37.1
11	236	Manufacture of articles of concrete, cement and plaster	42.7	11	141	Manufacture of wearing apparel, except fur apparel	35.9
12	204	Manufacture of soap and detergents, cleaning and polishing preparations, perfumes and toilet preparations	42.6	12	273	Manufacture of wiring and wiring devices	33.5
13	221	Manufacture of rubber products	39.9	13	143	Manufacture of knitted and crocheted apparel	32.2
14	205	Manufacture of other chemical products	39.0	14	102	Processing and preserving of fish, crustaceans and molluscs	31.8
15	181	Printing and service activities related to printing	36.2	15	104	Manufacture of vegetable and animal oils and fats	31.3

Note: Confidential trade not allocated.
Source: UN Comtrade.

Annex Table 3 / Largest decrease and increase of export shares going to CESEE-20, 2004-2015

Largest decrease			in pp	Largest increase			in pp
1	191	Manufacture of coke oven products	-48.5	1	253	Manufacture of steam generators, except central heating hot water boilers	41.2
2	233	Manufacture of clay building materials	-31.8	2	143	Manufacture of knitted and crocheted apparel	16.5
3	267	Manufacture of optical instruments and photographic equipment	-20.7	3	141	Manufacture of wearing apparel, except fur apparel	16.3
4	192	Manufacture of refined petroleum products	-19.5	4	263	Manufacture of communication equipment	15.4
5	181	Printing and service activities related to printing	-19.3	5	202	Manufacture of pesticides and other agrochemical products	14.0
6	264	Manufacture of consumer electronics	-18.6	6	292	Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers	13.8
7	120	Manufacture of tobacco products	-18.0	7	161	Sawmilling and planing of wood	13.7
8	236	Manufacture of articles of concrete, cement and plaster	-17.7	8	235	Manufacture of cement, lime and plaster	12.7
9	279	Manufacture of other electrical equipment	-15.8	9	254	Manufacture of weapons and ammunition	12.6
10	102	Processing and preserving of fish, crustaceans and molluscs	-12.5	10	206	Manufacture of man-made fibres	9.1
11	211	Manufacture of basic pharmaceutical products	-11.2	11	291	Manufacture of motor vehicles	8.7
12	273	Manufacture of wiring and wiring devices	-10.0	12	171	Manufacture of pulp, paper and paperboard	8.3
13	324	Manufacture of games and toys	-9.8	13	321	Manufacture of jewellery, bijouterie and related articles	7.1
14	265	Manufacture of instruments and appliances for measuring, testing and navigation; watches and clocks	-9.5	14	151	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery and harness; dressing and dyeing of fur	7.0
15	303	Manufacture of air and spacecraft and related machinery	-9.2	15	103	Processing and preserving of fruit and vegetables	6.5

Note: Confidential trade not allocated.
Source: UN Comtrade.

Excursus 1: Global market shares analysis

In this section, we analyse developments of the global market shares of Austria as compared to the countries of the CESEE region as well as Germany, its key trading partner and competitor. The questions to be asked are (i) whether after forming supply chains with the CESEE countries, Austria has been losing its non-price competitiveness, (ii) whether companies from CESEE have been improving the quality of their production, and (iii) whether Germany has been outperforming Austria in terms of non-price competitiveness.

Following the approach of Benkovskis and Wörz (2014), we decompose the changes in market shares of Austria, Germany, and CESEE countries using the updated WIOD dataset in combination with the detailed merchandise trade statistics from UN Comtrade[4]. Global market shares of countries are estimated in value added rather than gross exports terms, which allows us to measure the effect of countries' participation in global value chains. The authors use one of a set of recently introduced measures – 'value added in gross exports' (VAS), which captures all upstream value added contributions to gross exports. Unlike another value-added measure – 'value-added exports' (VAX), VAS focuses on gross exports including exports of intermediate goods and therefore double-counts some value-added activities. VAS excludes trade in services (services are accounted for only implicitly). However, the difference between changes in cumulative VAS of goods and gross export market shares is rather small for most countries according to the authors.

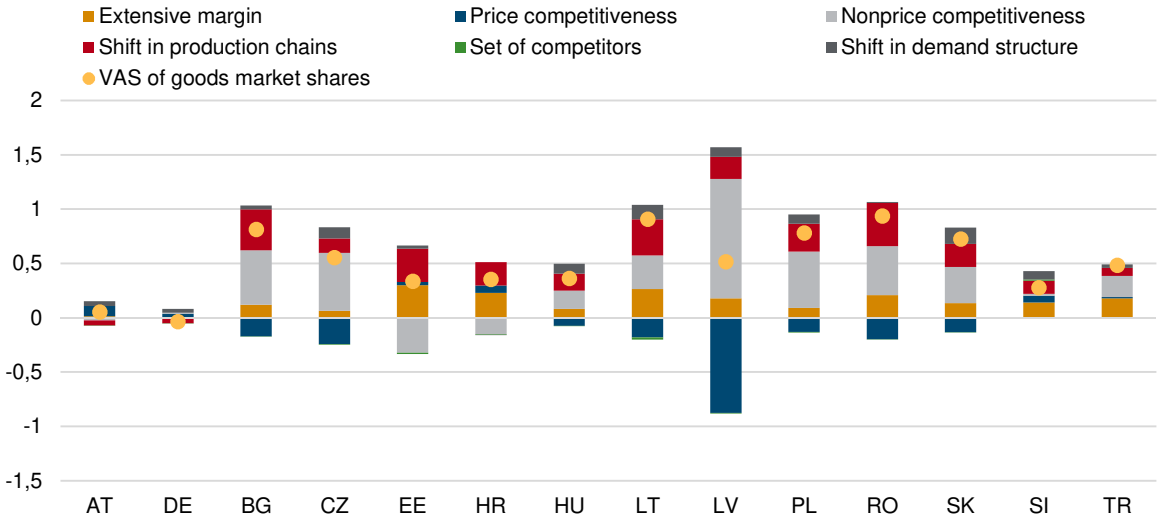
The estimated changes in export market shares in terms of value added are decomposed into changes in extensive and intensive margins. The latter are then split into four components: price effects, changes in the set of competitors, a term which captures shifts in a country's integration in global production chains and residual non-price effects (that to a large extent can be attributed to changes in product quality and consumers' taste factors). The conventional view, which ignores international fragmentation of production, tends to exaggerate the importance of residual non-price factors, while accounting for international fragmentation of production reduces the unexplained gains in global market shares.

Figure 19 presents the results of the decomposition for Austria, Germany and 12 CESEE countries[5]. The first observation to be made is that Austria, in contrast to Germany, managed to increase its global market share of value added in gross exports. At the same time, CESEE countries outperformed Austria by far in terms of their global market shares' growth rates. The most dynamic growth according to the estimates was in Romania, Lithuania, Bulgaria, Poland and Slovakia.

[4] Special thanks to Konstantins Benkovskis, who provided the estimates using a proprietary programming code.

[5] Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia and Turkey

Figure 19 / Decomposition of VAS of goods market share changes*, cumulative for 2000-2014



*Note: Results denote cumulative log-changes of global market shares.
Source: WIOD, UN Comtrade, Benkovskis and Wörz (forthcoming).

With respect to the factors determining changes in global value-added market shares, the largest contribution for Austria comes from improved price competitiveness. Germany has experienced an increase in price competitiveness over 2000-2014 as well. A likely reason for that was an expansion of the regional production networks that allowed cutting costs of exports production. Most of the CESEE countries in our sample, apart from Croatia, Estonia, Slovenia and Turkey, had negative contributions of price competitiveness factor – likely due to growing wages that cause costs (and price) increases.

Austria and Germany diverge when it comes to non-price competitiveness: Germany managed to improve its performance in this regard while this factor contributed negatively to Austria's global market share growth. Most CESEE countries, apart from Croatia and Estonia, had positive contributions of non-price competitiveness, likely due to improving the quality of their export products through the adoption of new, more advanced technologies. Moreover, in most CESEE countries the factor of non-price competitiveness provided the biggest contribution to their global market shares change.

Both Germany and Austria experienced negative contributions of shifts in production chains, while all the CESEE countries in our sample had shifts in production chains contributing positively to their market shares growth. This means that Austria and Germany have moved upstream along the value chain, away from the final consumer, and therefore export less value added. The CESEE countries that have been known for specialising in assembling motor vehicles and other final stage activities have experienced positive effects of their participation in regional production chains on their VAS market shares.

To sum up, it appears that Germany has outperformed Austria in terms of non-price competitiveness, albeit by a tiny margin. The loss of global market share of Germany is caused primarily by moving upstream in the regional production chains. Austria, though it managed to increase its global export market share in terms of value added, achieved it primarily through an increase in its price

competitiveness. CESEE countries overall had dynamic growth in the global market shares, mainly on the back of improving non-price competitiveness and shifting their positions in the regional value chains.

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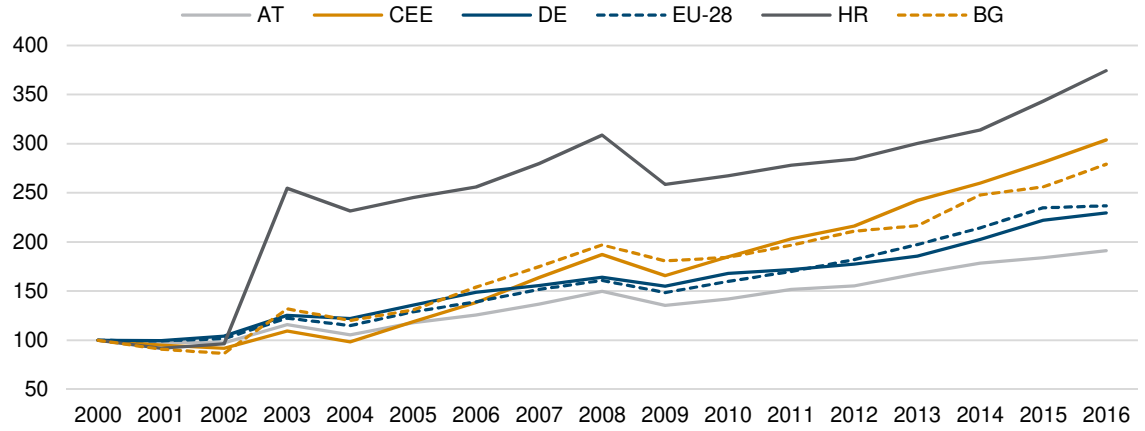
Excursus 2: Austria's services trade developments

Austria's services exports accounted for about 30% of total exports by value in 2017 (according to OeNB data). The share of services in trade is even higher when one looks at trade from the value added perspective – the domestic services value added share makes up almost half of gross exports. The share of services further increases if sales of services through foreign affiliates of multinational companies are added[6]. Moreover, services sectors stand out as a major destination for Austrian outward FDI, accounting for 74% of the outward direct investment stock in 2017.

In this section we will analyse mostly data on services trade in Mode 1 and 2 (cross-border trade and consumption abroad), which are reported in the Balance of Payments statistics. Modes 3 and 4 (commercial presence through foreign affiliates and presence of natural persons) cannot be included due to data limitations. Still, the available data can provide important insights into the issue of Austrian competitiveness with respect to services trade.

We look separately at the CEE region (comprised of the Czech Republic, Hungary, Estonia, Latvia, Lithuania, Poland, Slovakia and Slovenia), the SEE region (Albania, Bulgaria, Croatia, Macedonia, Montenegro, Russia, Serbia and Turkey), Germany and the rest of the EU-28 (EU members that are not included in the other country groups).

Figure 20 / Indices of services exports, 2000=100



Source: TSD, Eurostat; own calculations.

Austrian services exports have been growing rather sluggishly as compared to the EU-28 average, while CEE and SEE[7] countries have demonstrated much more dynamic growth (see Figure 20). This trend

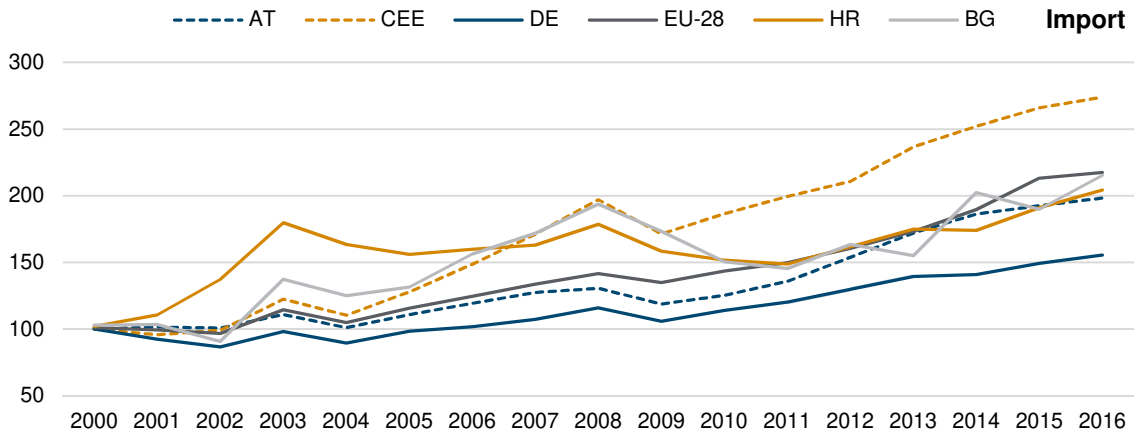
[6] Francois, J. and B. Hoekman (2010), 'Services Trade and Policy', Journal of Economic Literature, 48(3), pp. 642 92.

[7] Due to data limitations, here we can provide time series only for selected SEE countries.

might signal a possible loss of competitiveness in services trade by Austria. We will have a detailed look at the geographic and sector structure of services trade of the country to get some ideas about possible limitations to growth.

Imports of services increased in Austria at a similar pace as exports (see Figure 21). The CEE region stands out as the most dynamic in terms of import growth – during 2000-2016 its annual services imports almost tripled. Fast growth of services imports in the CEE region is most likely related to its role in the regional production networks. Without efficient markets for infrastructure services and business processes it is impossible to move intermediate inputs across borders and undertake complex coordination of production processes, therefore services sector development has to go hand in hand with participation in cross-border production networks.

Figure 21 / Indices of services imports, 2000=100



Source: TSD, Eurostat; own calculations.

Table 4 illustrates how strongly business services are intertwined with the rest of the economy. It shows the share of various categories of business-related services as a share of total intermediate inputs and the share of imported services in these categories in the manufacturing industry. For the EU-28, almost 15% of intermediates are business services, with partly large differences across countries, particularly in the Professional, scientific, technical, administration and support services activities which account for about 8% of intermediates for the EU-28. Austria uses business services less intensively than the EU-28 members on average – they account for 11% of intermediates. For the CEE this indicator is in the range between 5 and 10%.

There has been growing evidence that services inputs are productivity enhancing and thus potentially improving comparative advantages of manufacturing sectors (Arbache, 2015). Increased use of producer-related services in the production process allows for more complex organisation of a manufacturing firm through further fragmentation of production activities (Deardoff, 2001) and results in more efficient factor allocation (Oulton, 2001). There is also evidence that innovations in services (in particular knowledge-intensive business services) influence the productivity of a whole economy through numerous spill-over effects (Maroto-Sanchez and Cuadrado-Roura, 2008; Kox, 2004; Foster et al., 2012). The fact that Austria's manufacturing uses services inputs less intensively than many other EU

members, and in particular Germany, might mean that some manufacturing sectors are less productive compared to those in other countries.

In addition, in many countries a large share of these business services is imported. These imported services are particularly important in Information and communication services (18% for the EU-28) and Professional, scientific, technical, administration and support services activities (23%). Austria stands out as a country that imports relatively little services in the last category (15%), while all of the CEE countries apart from Poland outperform it in this regard.

A higher share of imported business services is found to impact positively on the productivity of downstream industries (Leitner et al., 2016). Moreover, use of foreign business services is also positively correlated with higher productivity and a higher share of high-skilled workers in manufacturing. A relatively low share of imported business services in Austria implies negative effects for the productivity of the country's manufacturing.

Table 4 / Use of business services in manufacturing and importance of imported business services

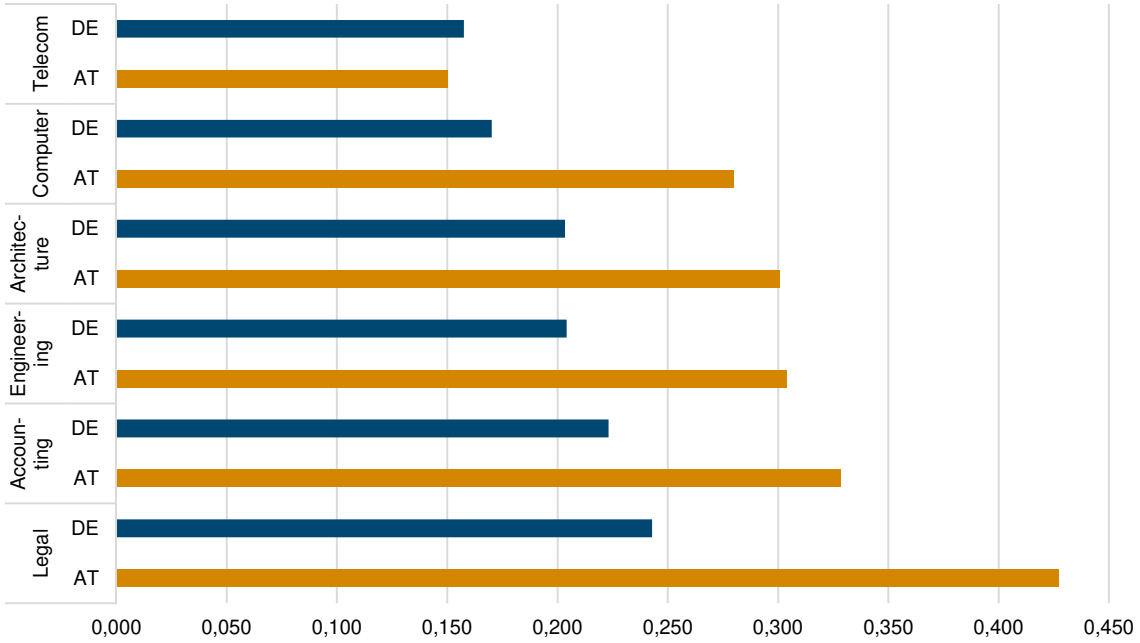
	Share of business services in total intermediate inputs				Share of imported business services			
	Information and communication	Financial and insurance activities	Real estate activities	Professional, scientific, technical, administration and support service activities	Information and communication	Financial and insurance activities	Real estate activities	Professional, scientific, technical, administration and support service activities
AT	1.3	2.3	1.4	6.1	29.5	8.7	0.7	14.9
BG	0.9	2.7	0.5	2.3	23.2	1.6	0.6	18.6
CZ	0.8	1.0	0.6	3.4	24.3	10.9	1.7	25.7
DE	1.7	1.7	1.9	10.6	20.1	8.4	0.5	20.8
EE	1.2	0.8	1.5	4.6	29.1	13.0	1.4	26.6
FIN	2.8	1.2	0.9	7.2	26.1	10.0	0.8	34.9
HR	1.4	2.3	2.1	7.2	26.8	12.3	0.4	16.4
HU	1.2	0.8	0.6	6.1	27.2	13.7	1.7	45.6
IT	1.6	2.8	1.5	7.6	9.2	4.6	1.0	10.8
LT	0.4	0.8	0.9	3.2	23.7	9.4	0.9	18.8
LV	1.0	1.2	1.3	3.7	21.5	11.3	1.2	16.0
PL	1.2	1.3	0.4	4.4	17.4	7.1	3.0	11.4
RO	1.7	1.8	0.3	5.5	12.2	6.0	1.1	7.9
SK	0.6	0.4	0.3	3.5	20.8	11.3	2.7	14.6
SI	1.3	1.9	0.7	6.4	19.4	7.4	1.9	21.8
EU-28	1.6	2.1	1.1	8.4	18.4	8.5	0.9	23.1

Source: WIOD; own calculations.

One of the reasons behind a lower share of imported services in Austria can be higher barriers to trade in the country. Though the treaty establishing the European Community guarantees freedom of establishment of service companies and freedom to provide services on the territory of another EU Member State, barriers to services trade have remained quite significant as national regulatory regimes continue to segment services markets (Kox and Lejour, 2007). As Services Trade Restrictions

Indices (STRI) compiled by the OECD[8] show, Austria appears to have higher restrictions to trade than Germany in all the sectors apart from telecommunications, where the level of protection is the lowest among sectors. Barriers to trade are especially high in legal services.

Figure 22 / STRI indices in 2017*



*1 indicates the highest non-tariff measures (market completely closed to foreign service providers), and 0 means a fully liberalised sector.
Source: OECD.

GEOGRAPHIC AND SECTOR STRUCTURE OF SERVICES TRADE

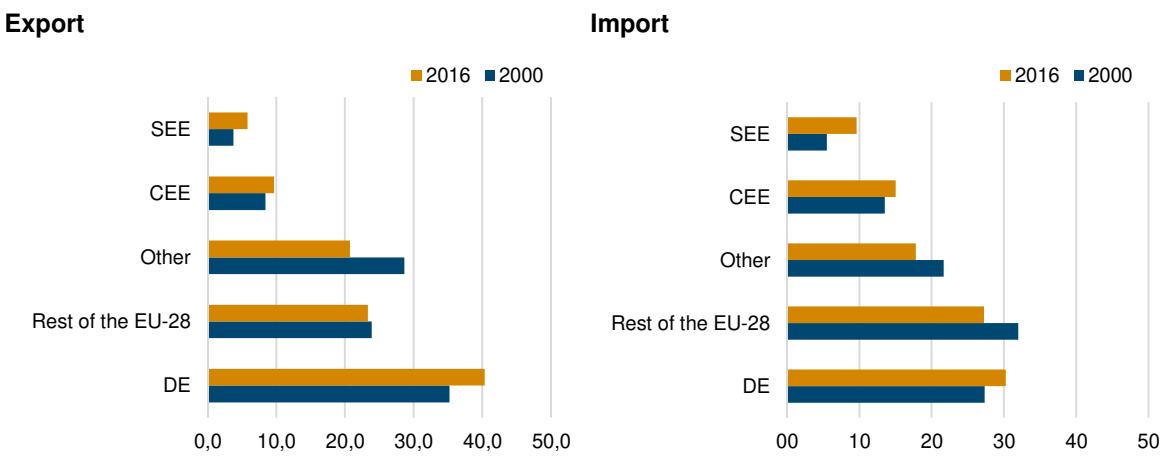
The CESEE region has been gaining importance in Austrian trade in services. Figure 23 shows that Austrian services exports have become more concentrated geographically over time, with growing shares of Germany and CESEE. This probably reflects the country's involvement in the regional production chains. Germany is by far the most important trading partner of Austria accounting for 40% of its services exports in 2016, up by 5pp as compared to 2000. The shares of CEE and SEE in exports increased during 2000-2016 by 1pp to 10% and by 2pp to 4% respectively. Together Germany and CESEE countries account for about 55% of the country's services exports.

CEE and SEE play an increasingly important role as countries of origin of Austrian services imports. In 2016, CEE and SEE accounted for 15% and 10% of the country's services imports respectively, up by 1.5pp and 4pp as compared to 2000. Germany's share also increased during this period – by 3 pp to

[8] The OECD STRI database contains indices that are a measure of MFN restrictions and does not take into account any specific concessions. It was assembled by analysing laws and regulations in 34 OECD countries and Brazil, China, India, Indonesia, Russia and South Africa. The policy measures are grouped under the same five policy areas in all sectors and are turned into an index using a scoring and weighting technique that is based on a number of studies and expert meetings.

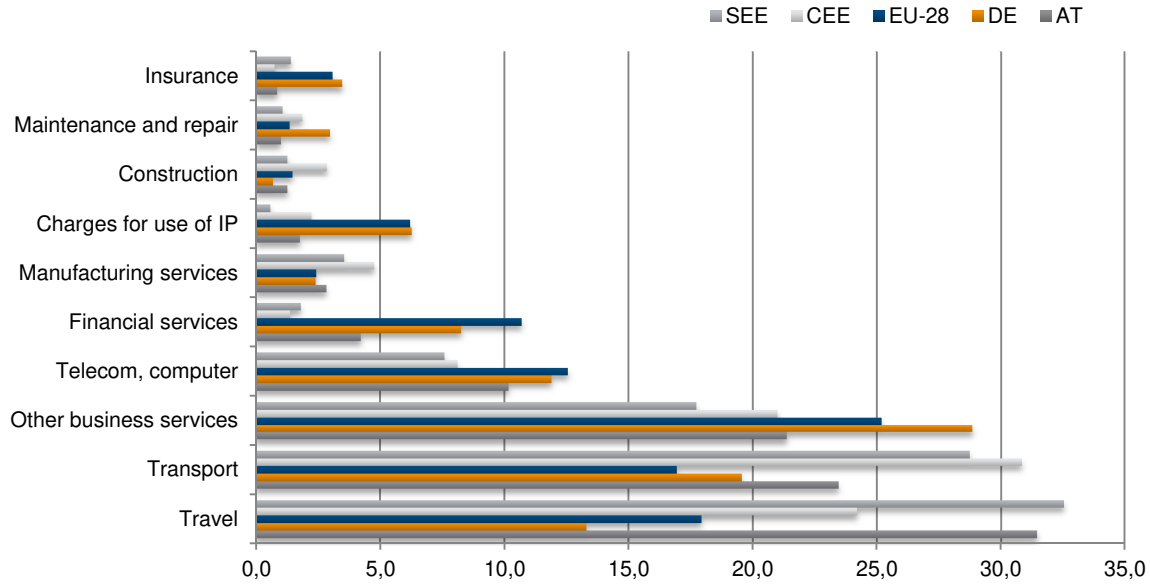
30%. As in the case of the exports structure, Germany and CESEE countries together account for more than a half of services imports.

Figure 23 / Geographic structure of services trade of Austria, in %



Source: TSD, Eurostat; own calculations.

Figure 24 / Sectoral structure of Austrian services exports in 2016, in % of total



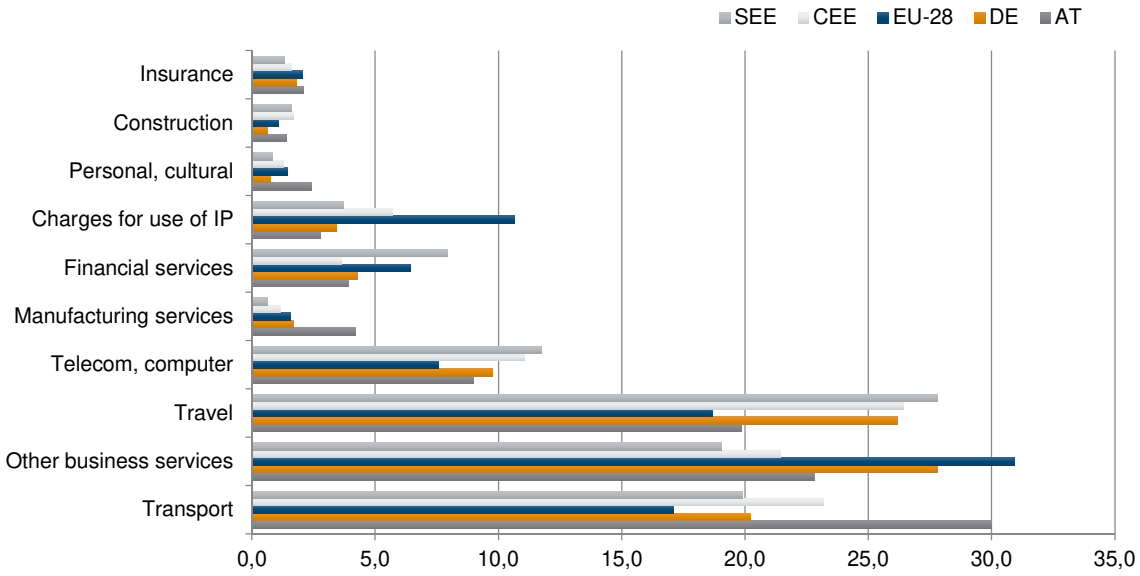
Source: Eurostat; own calculations.

Another dimension of the analysis would be to compare services trade structures between Austria and its main trading partners. As Figure 24 shows, travel services are the main export sector (31% of total services exports – which is more than double the indicator for Germany, and about 14pp higher than the average for the EU-28). Other business services and telecom and computer services account for 21% and 10% respectively, which is again noticeably lower than the values for Germany and the EU-28 average. Both R&D and professional and management consulting services account for smaller shares of

exports as compared with Germany (share of R&D in Austrian services exports is at about 4%, while in Germany it is at 8%; for professional and management consulting services the shares are 6% and 10% respectively). It is likely that Germany has stronger comparative advantages as a provider of producer related services than Austria.

Transport services account for the highest share in Austria's services imports (see Figure 25) – this is to be expected given the expansion of regional production networks involving the country. Other business services account for a smaller share of imports as compared with Germany and the EU-28 average. In particular, the share of R&D is rather small – 2% versus 7% in Germany and 7% on average in the EU-28.

Figure 25 / Sectoral structure of Austrian services imports in 2016, in % of total



Source: Eurostat; own calculations.

Next, we look at the geographic structure of Austria's services trade for each sector which can provide additional insights into the competitiveness of the country's services industry (see Table 5). The CESEE region together with Germany accounts for the bulk of exports in most sectors apart from manufacturing services, charges for IP and R&D. Germany in turn stands out as a main destination of the country's exports in construction and maintenance and repair; its shares in Austrian exports are 60.7% and 52.5% respectively. R&D and travel services are also exported relatively more intensively to Germany (when compared with the share of the country in total services exports). At the same time shares of Germany in exports of insurance, financial services and charges for use of intellectual property are relatively low. CEE countries appear to play a significant role for Austrian insurance providers as they account for almost one-third of this sector's exports. The SEE region is an important destination for the country's financial services exports (22.7% of the sector's exports).

When it comes to imports the picture is slightly more diverse, with the CESEE region together with Germany accounting for less than 50% of imports in many sectors. Still, Germany is the biggest imports provider in many sectors, especially in maintenance and repair, R&D, construction and charges for use

of IP. CEE and SEE countries have relatively high shares in Austria's imports of transport services, reflecting their role in the regional production networks.

Table 5 / Geographic structure of Austria's services trade by sector in 2016, in %

BOPS	Sector	DE	CEE	SEE	DE+CEE +SEE	Rest of EU-28	EXT_EU-28	Total
		Export						
S	Total	40.3	9.7	5.4	55.5	23.4	23.8	100.0
SA	Manufacturing services	30.7	3.1	2.0	35.8	8.3	55.8	100.0
SB	Maintenance and repair	52.5	11.6	2.5	66.7	22.1	11.8	100.0
SC	Transport	39.0	10.5	4.6	54.0	29.4	19.0	100.0
SD	Travel	47.5	10.0	3.8	61.3	22.3	18.2	100.0
SE	Construction	60.7	6.6	4.3	71.6	13.8	14.9	100.0
SF	Insurance	27.6	31.8	13.2	72.6	23.3	4.7	100.0
SG	Financial services	23.0	9.4	22.7	55.1	20.4	39.6	100.0
SH	Charges for use of IP	24.5	10.8	5.9	41.2	25.0	36.2	100.0
SI	Telecom, computer	32.9	10.4	8.1	51.4	24.6	27.5	100.0
SJ	Other business services	41.0	8.6	4.1	53.7	21.0	27.1	100.0
SJ1	R&D	47.5	0.9	0.5	48.9	17.6	33.9	100.0
SJ2	Professional and management consulting	38.8	9.5	4.4	52.8	26.5	22.5	100.0
SJ3	Technical, trade related and other	39.8	10.7	5.1	55.6	19.5	27.1	100.0
SK	Personal, cultural	45.3	7.4	5.3	58.1	26.1	16.5	100.0
		Import						
S	Total	30.3	15.0	9.1	54.4	27.2	20.8	100.0
SA	Manufacturing services	14.7	14.2	7.0	35.9	39.2	25.1	100.0
SB	Maintenance and repair	61.7	11.5	3.0	76.2	14.3	9.8	100.0
SC	Transport	23.8	26.7	13.6	64.1	18.5	21.7	100.0
SD	Travel	24.8	8.2	12.1	45.1	36.5	20.3	100.0
SE	Construction	45.0	25.1	2.8	72.8	16.4	11.1	100.0
SF	Insurance	21.6	6.6	1.4	29.6	27.1	44.0	100.0
SG	Financial services	32.0	3.4	6.0	41.4	34.8	26.0	100.0
SH	Charges for use of IP	44.7	2.8	0.6	48.1	33.0	19.1	100.0
SI	Telecom, computer	35.2	8.8	4.6	48.6	36.0	16.7	100.0
SJ	Other business services	40.7	10.5	4.9	56.1	25.1	20.6	100.0
SJ1	R&D	57.5	6.5	2.7	66.7	19.2	16.2	100.0
SJ2	Professional and management consulting	35.9	9.0	5.3	50.2	30.6	21.8	100.0
SJ3	Technical, trade related and other	41.3	12.1	4.9	58.2	22.5	20.5	100.0
SK	Personal, cultural	30.2	29.4	11.7	71.3	21.5	7.3	100.0

Source: Eurostat; own calculations.

To sum up, Austria's involvement in the regional production chains appears to be a reason behind increasing geographic concentration of its exports, with growing shares of Germany and CESEE. The country's role in the production chains currently lies in exporting mainly 'traditional' services such as transport and travel services, while Germany exports relatively more hi-tech services and R&D. Austrian manufacturing uses services inputs, in particular imported business services inputs, less intensively than many other EU members, which implies negative effects for the productivity of the country's manufacturing as compared to its main trading partners, especially Germany. Based on these developments, it is likely that Germany has stronger comparative advantages as a provider of producer related services than Austria.

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Excursus 3: The link between industry-level territorial trade specialisation lock-in and foundational competitiveness

To investigate whether Austria suffers from a lock-in situation at the mesoeconomic level we employ a gravity model approach. This gravity model is estimated for a set of broad industry groups classified by technology intensity according to the OECD classification. This leads to four groups of industries, which are high (HT), medium-high (MHT), medium-low (MLT) and low (LT) technology intensity industries (see Hatzichronoglou, 1997).

Focusing on these four broad industry groups allows for a more systematic analysis on the lock-in effect. The following gravity model is estimated over the period 1995-2015 for the exports of the EU-15 as source countries to all individual partner countries. The model is estimated separately for each of the four industry groups by technology intensity, *j* (so $j \in \{LT, MLT, MHT, HT\}$):

$$X_{jcdt} = \gamma_0 + \gamma_1 \cdot GDP_{ct} + \gamma_2 \cdot GDP_{dt} + \gamma_3 \cdot \tau_{jcdt} + \gamma_4 \cdot TBT_{jcdt} + \gamma_5 \cdot SPS_{jcdt} + \gamma_6 \cdot \Gamma_{cd} + \delta_t + \epsilon_{jcdt} \qquad (1)$$

where X_{jcdt} is the export value in US dollar in industry *j* from country *c* to destination country *d* at time *t.* Analogously, GDP_{ct} is the GDP of exporting country *c*, GDP_{dt} is the GDP of the destination country *d.* Apart from the tariffs that exporting country *c* faces when exporting to country *d* in industry *j* at time *t*, τ_{jcdt}, the model also includes the two main categories of non-tariff measures (NTMs) which are technical barriers to trade, TBT_{jcdt}, and sanitary and phytosanitary measures, SPS_{jcdt}. In addition, we also control for a set of (bilateral) gravity variables – denoted by Γ_{cd}, – which include distance (in logs), contiguity and sharing an official language. All these additional gravity variables as well as the distance measure are taken from the CEPII gravity database (Head et al., 2010). The trade costs variables are taken from Ghodsi et al. (2017).[9] The GDP data were obtained from the Penn World Tables (PWT 8.1).

In contrast to the large number of explanatory variables, the model features hardly any dummies, which are limited to time dummies, δ_t. ϵ_{jcdt} denotes the error term. The reason for the parsimonious approach with regards to the dummy structure of the model is due to the fact that we are not predominantly concerned with the precision of the coefficients of the GDPs and trade costs but rather with purging the export data from the standard gravity effects. In contrast, country idiosyncrasies and country-pair specific characteristics should be assigned to the lock-in effect. Therefore, we abstain from including exporter, importer and exporter-importer fixed effects as these unobserved characteristics are deemed a part of the explanation for any potential lock-in effect.[10]

[9] The authors would like to thank Mahdi Ghodsi for providing the tariff and NTM data.

[10] Neither do we control for multilateral resistance terms for essentially the same reason.

The main purpose of the gravity model is to identify the lock-in effect for each of the four industries (*lockin j*). This lock-in effect is defined as the difference between the observed exports of country *c* to country *d* at time *t* and the corresponding predicted exports from our gravity model ($\hat{X}_{jcdt}$), i.e.

$$lockin_j = X_{jcdt} - \hat{X}_{jcdt}$$

If the actual exports exceed the predicted values, i.e. if $X_{jcdt} > \hat{X}_{jcdt}$ there is a positive lock-in effect (and vice versa). This means country *c* is exporting more to country *d* at time *t* in the respective industry *j* (for example, medium-high tech, *MHT*) than predicted by the gravity model.

The gravity model yields the expected results with regard to the main explanatory variables (Table 6). In particular, exports are increasing with the economic size of the trading partners involved and decreasing with distance and with tariff protection, i.e. with trade costs.[11] The intuitive results together with the high explanatory power of the model – which ranges from 75% to 82% – makes us confident that we can construct reasonable lock-in effects based on the model.

Table 6 / Gravity results

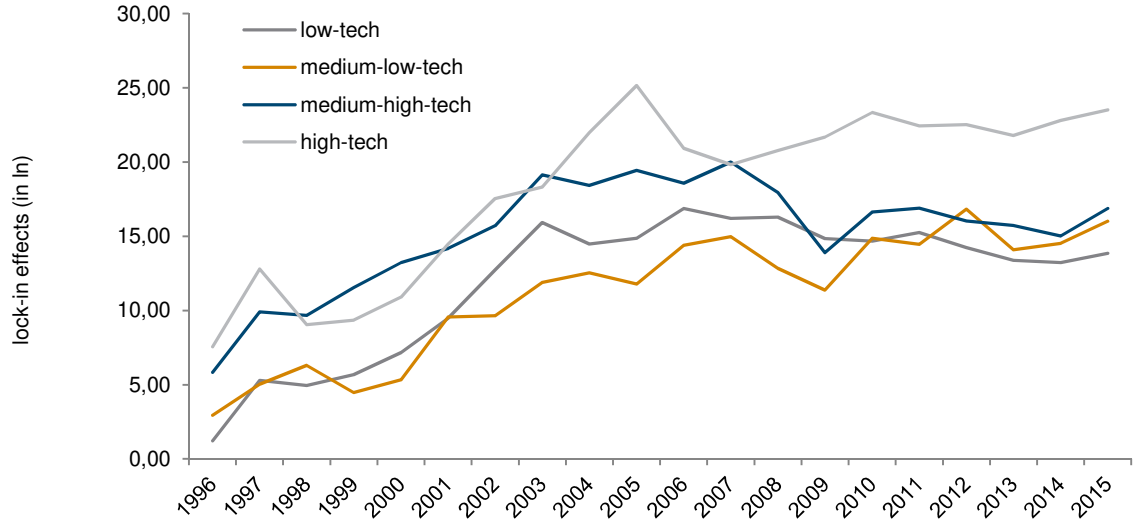
Dependent variable: log of gross exports		**medium-low-**	**medium-high-**	
Industry	**low-tech**	**tech**	**tech**	**high-tech**
	(1)	**(2)**	**(3)**	**(4)**
ln GDP_c	1.2006***	1.1922***	1.2933***	1.3054***
	(0.0087)	(0.0079)	(0.0060)	(0.0081)
ln GDP_d	0.9439***	0.9935***	1.0204***	1.0639***
	(0.0041)	(0.0049)	(0.0039)	(0.0047)
τ (import weighted)	-0.0104***	-0.0156**	-0.0044***	-0.0379***
	(0.0011)	(0.0065)	(0.0016)	(0.0024)
TBT (import weighted)	0.0080***	-0.0018	-0.0008	0.0033**
	(0.0011)	(0.0028)	(0.0013)	(0.0013)
SPS (import weighted)	0.0040***	-0.0079***	-0.0031***	0.0009
	(0.0008)	(0.0027)	(0.0011)	(0.0006)
ln distance	-1.1088***	-1.2010***	-0.9484***	-0.8651***
	(0.0102)	(0.0195)	(0.0097)	(0.0112)
common border	-0.0204	0.3294***	0.0118	-0.2157***
	(0.0442)	(0.0468)	(0.0395)	(0.0435)
common language	1.1359***	0.9103***	1.0264***	1.1744***
	(0.0325)	(0.0385)	(0.0262)	(0.0310)
constant	-29.1261***	-30.1730***	-34.6105***	-37.6159***
	(0.2793)	(0.2804)	(0.2181)	(0.2768)
Obs.	37,973	37,268	38,488	37,249
R-sq.	0.765	0.743	0.822	0.748
R-sq.-adj.	0.765	0.742	0.822	0.748
F	4064	4032	5813	4467

Note: Robust standard errors in parentheses. ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels respectively. All regressions include a constant. Regressions use each reporter's sample averages.

[11] Note that NTMs do not necessarily constitute trade barriers as TBTs and SPS requirements may lead to the exports of goods with higher quality and hence higher value.

When applying the above definition for the lock-in effect, positive lock-in effects are obtained for Austria's trade with its partners in the CESEE region (Figure 26). The estimated lock-in effects are consistently positive across the four industries and they have increased over time. Most of the increase in the lock-in effect, however, already occurred before the Great Recession of 2008 with a more or less constant lock-in effect since then, apart from the high-tech industry, where the lock-in effects have kept growing.

Figure 26 / Lock-in effects in Austria's trade with the CESEE region



Note: Lock-in effects are calculated as $X_{jcdt} - \hat{X}_{jcdt}$ where the exports are expressed in logs of the nominal US dollar values. Sum of the individual lock-in effects obtained for Austria in trade with the individual CESEE partner countries.
Source: Own calculations.

ECONOMETRIC APPROACH: THE LINK BETWEEN A POTENTIAL INDUSTRY SPECIALISATION LOCK-IN AND COMPETITIVENESS

We continue by analysing the impact of any potential trade specialisation lock-in that we may find on national competitiveness. To this end, we use the difference between actual values and predicted values (from the gravity model) of the EU-15 countries' total exports to the CESEE region and relate them to our preferred competitiveness variable over the period 1995-2014. This is done by adding up the pairwise 'lock-in effects' between the EU-15 countries and their trading partners as defined in the previous section.

In a broad sense, one can define competitiveness as 'the ability [of an economic system] to evolve in accordance with a long-term rise in living standards' (Peneder, 2017, p. 838). However, much of the literature following this broad definition has solely focused on productivity as the preferred measure of an economy's ability to produce (sustainable) high incomes (Hall and Jones, 1999; Aiginger, 2006). Measuring productivity with an indicator such as GDP per worker, however, would neglect the fact that there is large cross-country variation in how economies are able to mobilise the working-age population. Against this background, Delgado et al. (2012) have proposed a definition of 'foundational competitiveness' as the expected level of output per working-age individual, which captures the productivity of employed workers in an economy as well as its ability to employ a large share of the

available work-force. Here, we use the definition of 'foundational competitiveness', which can be operationalised as GDP at PPP per working-age individual.

We are able to obtain 224 observations for each industry group (15 reporter countries over the time period 1995-2014). The suggested regression specification that is used to explain 'foundational competitiveness' (COMP) takes a form similar to the baseline model in Delgado et al. (2012) and is estimated for each of the four industry groups:

$$\ln(COMP)_{i,t} = \alpha + \beta\, z_{i,t} + \gamma\, lockin_{r,i,t} + \delta_1\, FE_i + \delta_2\, FE_t + \varepsilon_{i,t}$$

where $\ln(COMP)_{i,t}$ is the natural logarithm of foundational competitiveness in country i at time t, z is a vector of explanatory variables (including population, investment share, trade to GDP, human capital index and inflation; for details on the data sources see Table 7). $lockin_{r,i,t}$ is the main variable of interest, namely the difference between predicted values (from the gravity model) and actual values of country i's total exports to the CESEE region. FE_i are country-fixed effects, which we include to account for unmeasurable, time-invariant country-specific characteristics that may influence foundational competitiveness. FE_t are period-fixed effects, which we include to account for shocks that might hit all countries at the same time. The equation is estimated by using OLS; furthermore, we cluster the standard errors by country.

Table 7 / Data used for regression specifications

	Data description	Data source
lockinLT	Average difference between gravity-model prediction and actual export value for low technology intensity industry group for exports to CESEE region	Own calculations (see text)
lockinMLT	Average difference between gravity-model prediction and actual export value for medium-low technology intensity industry group for exports to CESEE region	Own calculations (see text)
lockinMHT	Average difference between gravity-model prediction and actual export value for medium-high technology intensity industry group for exports to CESEE region	Own calculations (see text)
lockinHT	Average difference between gravity-model prediction and actual export value for high technology intensity industry group for exports to CESEE region	Own calculations (see text)
log(COMP)	Natural logarithm of foundational competitiveness (GDP at PPP per working-age population)	Penn World Table (version 9.0), own calculations
Log(pop)	Natural logarithm of population	Penn World Table (version 9.0)
inv share	Share of gross capital formation at PPP, 5-year average	Penn World Table (version 9.0), own calculations
hc	human capital index based on years of schooling and returns to education, 5-year average	Penn World Table (version 9.0), own calculations
inflation	Inflation rate	World Bank (WDI)
trade	Sum of exports and imports of goods	World Bank (WDI)
Exp_share_CESEE	Export share (in % of total exports) to the CESEE region	IMF (Direction of Trade); own calculations

REGRESSION RESULTS FOR THE PERIOD 1995-2014

Results for each industry group are shown separately in models (1)-(4) in Table 8. A negative coefficient of the lock-in variable for trade specialisation would indicate that foundational competitiveness is deteriorating due to an oversized and persistent engagement of exports with the CESEE region. As can be seen from Table 8, we find some evidence for a negative correlation of the lock-in variable with the level of foundational competitiveness over the time period 1995-2014. For the low technology intensity (LT) and the medium-low technology intensity (MLT) industries, the lock-in coefficient is negative and statistically significant, but not at the 99% confidence level. For the medium-high technology intensity (MHT) and high technology intensity industries (HT), the coefficient is negative but not significant. We can interpret this finding in the sense that our regression results do not provide strong support for the hypothesis that there is a trade specialisation industrial-lock-in effect for the EU-15 countries with the CESEE region in relation to national competitiveness (over the time period 1995-2014), but for the LT and MLT sectors there is some preliminary evidence. Notably, the set of control variables included in the regressions explains large parts of the variation in foundational competitiveness, as the adjusted R squared in the models (1) to (4) lies in a range from about 37% to 45%.

Table 8 / Lock-in 1995-2014, EU-15 sample

	Dependent variable: Log (COMP)			
	(1) LT	(2) MLT	(3) MHT	(4) HT
lockinLT	-0.067**			
	(0.029)			
lockinMLT		-0.054*		
		(0.028)		
lockinMHT			-0.026	
			(0.035)	
lockinHT				-0.032
				(0.032)
log pop	0.739***	0.715***	1.075***	1.041***
	(0.140)	(0.223)	(0.391)	(0.271)
trade	-0.001	-0.001	-0.001	-0.0001
	(0.001)	(0.0004)	(0.0005)	(0.0003)
hc	-0.985***	-0.950***	-1.186***	-1.26***
	(0.196)	(0.178)	(0.321)	(0.143)
inflation	0.007	0.004	0.005	0.006
	(0.004)	(0.004)	(0.004)	(0.006)
inv share	0.261	0.237	0.269	0.253
	(0.367)	(0.349)	(0.400)	(0.373)
Observations	224	224	224	205
R^2	0.436	0.408	0.368	0.450
Adjusted R^2	0.332	0.298	0.250	0.340
Country and period-fixed effects	yes	yes	yes	yes

Note: p*<0.1; p**<0.05; p***<0.01.

In Table 9, we continue by assessing whether the intensity of the trade relations with the CESEE region is important. Formally, we test this aspect by including an interaction term of the lock-in variable with the export share to the CESEE region. However, we do not find any relevant interaction term that is negative and statistically significant. Hence, we do not find evidence that the industrial specialisation lock-in effect increases with a higher export share to the CESEE region. Notably, the LT and the HT coefficients switch to a positive sign after introducing the interaction term. Hence, after introducing the interaction

with the CESEE export share, the evidence for the existence of a lock-in effect of the EU-15 countries with the CESEE region weakens in comparison to Table 8.

Table 9 / Lock-in 1995-2014, EU-15 sample; including interaction terms with CESEE export share

	Dependent variable: Log (COMP)			
	(1)	(2)	(3)	(4)
LT	LT	MLT	MHT	HT
lockinLT	0.081**			
	(0.035)			
lockinMLT		-0.049		
		(0.036)		
lockinMHT			-0.024	
			(0.039)	
lockinHT				0.278
				(0.041)
exp share CESEE	-0.888	-0.229	-0.555	0.278
	(0.696)	(1.034)	(0.803)	(0.623)
log pop	0.502**	0.632**	0.931**	1.108***
	(0.229)	(0.274)	(0.389)	(0.223)
trade	-0.001	-0.001	-0.0004	-0.0001
	(0.0005)	(0.0004)	(0.001)	(0.0003)
hc	-0.799***	-0.891***	-1.186***	-1.300***
	(0.273)	(0.245)	(0.354)	(0.127)
inflation	0.005	0.003	0.004	0.007
	(0.005)	(0.004)	(0.004)	(0.005)
inv share	-0.154	-0.244	-0.286	-0.246
	(0.297)	(0.277)	(0.368)	(0.259)
lockinLT:exp share CESEE	0.286			
	(0.336)			
lockinMLT:exp share CESEE		-0.073		
		(0.358)		
lockinMHT:exp share CESEE			-0.192	
			(0.335)	
lockinHT:exp share CESEE				0.021
				(0.288)
Observations	224	224	224	205
R^2	0.453	0.413	0.382	0.451
Adjusted R^2	0.344	0.296	0.259	0.334
Country and period-fixed effects	yes	yes	yes	yes

Note: p*<0.1; p**<0.05; p***<0.01.

In Table 10, we are interested in directly testing whether the industrial specialisation lock-in effect with the CESEE region might be different for Austria in comparison with the rest of the EU-15. Including an interaction term of a dummy variable for Austria with the lock-in variable allows for testing this hypothesis. However, for the time period 1995-2014, we do not find evidence that the Austrian industry is exposed to a more pronounced lock-in effect: the coefficient of the lock-in term has a positive sign in three of four industry groups, but the (negative) impact of the lock-in variable on foundational competitiveness in the MHT industry is marginally stronger in Austria than for the rest of the EU-15 sample. In summary, over the time period 1995-2014, the econometric evidence presented so far does *not* lend strong support for the hypothesis that an excessively specialised Austrian industry that is exposed to the CESEE region has a negative impact on national competitiveness.

Table 10 / Lock-in 1995-2014, EU-15 sample; including interaction terms with Austria dummy variable

	Dependent variable: Log (COMP)			
	(1) LT	(2) MLT	(3) MHT	(4) HT
lockinLT	-0.067**			
	(0.030)			
lockinMLT		-0.054**		
		(0.027)		
lockinMHT			-0.026	
			(0.035)	
lockinHT				-0.033
				(0.032)
log pop	0.737***	0.716***	1.076***	1.042***
	(0.139)	(0.225)	(0.384)	(0.273)
trade	-0.001	-0.001	-0.001	-0.0001
	(0.001)	(0.0004)	(0.0005)	(0.0003)
hc	-0.987***	-0.952***	-1.180***	-1.264***
	(0.199)	(0.181)	(0.314)	(0.145)
inflation	0.007	0.004	0.005	0.006
	(0.004)	(0.004)	(0.004)	(0.006)
inv share	-0.255	-0.232	-0.301	-0.245
	(0.372)	(0.352)	(0.407)	(0.373)
lockinLT:dummy AUT	0.014			
	(0.037)			
lockinMLT:dummy AUT		0.019		
		(0.036)		
lockinMHT:dummy AUT			-0.087**	
			(0.044)	
lockinHT:dummy AUT				0.022
				(0.029)
Observations	224	224	224	205
R^2	0.437	0.409	0.372	0.451
Adjusted R^2	0.328	0.295	0.251	0.337
Country and period-fixed effects	yes	yes	yes	yes

Note: *p<0.1; **p<0.05; ***p<0.01.

REGRESSION RESULTS FOR THE POST-CRISIS PERIOD 2010-2014

However, we might also be interested in analysing whether there is something special about the post-crisis period. Hence, we replicate the results discussed above for the period 1995-2014 for the post-crisis period 2010-2014. As can be seen from Table 11, however, for the EU-15 sample we again do not find evidence for a significant impact of the lock-in variable on foundational competitiveness. Only for the MHT industry, the lock-in coefficient is negative, but not statistically significant; for the other three industry groups, the coefficient is even positive. This finding suggests that, on average, there is no trade specialisation industrial-lock-in effect for the EU-15 countries with the CESEE region in relation to national competitiveness over the post-crisis period.

Table 11 / Lock-in 2010-2014, EU-15 sample

	Dependent variable: log(COMP)			
	(1) LT	(2) MLT	(3) MHT	(4) HT
lockinLT	0.012			
	(0.043)			
lockinMLT		0.014		
		(0.022)		
lockinMHT			-0.045	
			(0.046)	
lockinHT				0.020
				(0.015)
log_ pop	0.509	0.605	0.248	0.707
	(0.363)	(0.486)	(0.405)	(0.488)
trade	0.003***	0.003***	0.003***	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)
hc	-1.129***	-1.092**	-1.144**	-1.120**
	(0.465)	(0.485)	(0.428)	(0.475)
inflation	0.015***	0.016***	0.014**	0.015***
	(0.005)	(0.005)	(0.005)	(0.005)
inv_share	-0.201	-0.020	-0.115	-0.066
	(0.210)	(0.311)	(0.250)	(0.295)
Observations	75	75	75	75
R^2	0.515	0.516	0.522	0.521
Adjusted R^2	0.282	0.284	0.293	0.291
Country and period-fixed effects	yes	yes	yes	yes

Note: *p<0.1; **p<0.05; ***p<0.01.

In Table 12, we again assess whether the intensity of the trade relation with the CESEE region plays an important role, but this time for the time period 2010-2014. It can be seen that for the MHT sector, the coefficient of the relevant interaction term is negative. This suggests that in the medium-high intensity technology industry group, the industrial specialisation lock-in effect increases with a higher export share to the CESEE region. However, the standard error is very large; hence, there is high uncertainty around these estimates. Hence, for the post-crisis period, the evidence is also not more supportive of the hypothesis that industries are significantly exposed to a potentially problematic industry specialisation lock-in effect with the CESEE region.

Table 12 / Lock-in 2010-2014, EU-15 sample; including interaction terms with CESEE export share

	Dependent variable: log (COMP)			
	(1) LT	(2) MLT	(3) MHT	(4) HT
lockinLT	0.042			
	(0.054)			
lockinMLT		0.006		
		(0.025)		
lockinMHT			-0.070	
			(0.071)	
lockinHT				0.011
				(0.027)
Exp_share_CESEE	-0.997*	-1.175**	-1.426*	-1.222**
	(0.570)	(0.557)	(0.790)	(0.485)
log(pop)	0.089	0.133	0.010	0.274
	(0.353)	(0.533)	(0.403)	(0.403)
trade	0.003	0.003	0.003	0.003
	(0.001)	(0.001)	(0.001)	(0.001)
hc	-0.952*	-0.974**	-0.97**	-0.965**
	(0.475)	(0.459)	(0.428)	(0.469)
inflation	0.010***	0.012***	0.012***	0.011***
	(0.004)	(0.004)	(0.004)	(0.004)
Inv_share	0.190	0.183	0.116	0.168
	(0.262)	(0.235)	(0.230)	(0.221)
lockinLT*Exp_share_CESEE	-0.430			
	(0.468)			
lockinMLT*Exp_share_CESEE		-0.013		
		(0.110)		
lockinMHT*Exp_share_CESEE			0.414	
			(0.574)	
lockinHT*Exp_share_CESEE				0.056
				(0.161)
Observations	75	75	75	75
R^2	0.561	0.554	0.561	0.560
Adjusted R^2	0.323	0.312	0.323	0.321
Country and period-fixed effects	yes	yes	yes	yes

Note: *p<0.1; **p<0.05; ***p<0.01.

In Table 13, we are interested in directly testing whether the industrial specialisation lock-in effect with the CESEE region might be different for Austria in comparison with the rest of the EU-15 over the post-crisis period 2010-2014. We indeed find some evidence that Austrian industries might be exposed to a move towards overspecialisation for the post-crisis period: the coefficient of the lock-in term suggests that in three of four industry groups, the (negative) impact of the lock-in variable on foundational competitiveness is stronger in Austria than for the rest of the EU-15 sample. However, the regression results should be interpreted carefully. First, the standard errors for the LT and HT industries only allow us to say that the coefficient is statistically significant at the 90% level of confidence. Second, it should be noted that the number of observations for the post crisis period has dropped substantially from 224 observations (over the 1994-2014 period) to 75, leading to correspondingly lower degrees of freedom. In conclusion, the regression results for the post-crisis period 2010-2014 provide suggestive evidence that there might have been a kind of shift towards a higher risk of overspecialisation for some of Austria's industries towards the CESEE region. Overall, however, the evidence remains too weak for strong conclusions, and the evidence over the whole 1995-2014 period is not very supportive of the lock-in hypothesis.

Table 13 / Lock-in 2010-2014, EU-15 sample; including interaction terms with Austria dummy variable

	Dependent variable: log (COMP)			
	(1) LT	(2) MLT	(3) MHT	(4) HT
lockinLT	0.014			
	(0.042)			
lockinMLT		0.011		
		(0.022)		
lockinMHT			-0.042	
			(0.044)	
lockinHT				0.020
				(0.016)
log pop	0.502	0.583	0.244	0.728
	(0.358)	(0.494)	(0.395)	(0.486)
trade	0.003***	0.003***	0.003***	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)
hc	-1.12**	-1.105**	-1.132**	-1.11**
	(0.463)	(0.487)	(0.428)	(0.467)
inflation	0.015***	0.016***	0.013**	0.014***
	(0.005)	(0.005)	(0.005)	(0.005)
inv.share	0.129	0.084	0.040	0.056
	(0.252)	(0.235)	(0.222)	(0.215)
lockinLT*dummy AUT	-0.147*			
	(0.080)			
lockinMLT*dummy AUT		0.158***		
		(0.040)		
lockinMHT*dummy AUT			-0.223**	
			(0.088)	
lockinHT*dummy AUT				-0.184*
				(0.103)
Observations	75	75	75	75
R^2	0.520	0.523	0.531	0.526
Adjusted R^2	0.275	0.280	0.291	0.284
Country and period-fixed effects	yes	yes	yes	yes

Note: *p<0.1; **p<0.05; ***p<0.01.

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