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Labour Market Effects of Trade in a Small Open Economy

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Abstract. Austria is a small open economy that in the last decades underwent two different waves of increasing trade integration: one with Eastern Europe and one with China. Drawing on trade theory, this paper studies the effects of increases in trade with China and Eastern Europe on labour market dynamics in Austrian NUTS-4 regions for two ten-year periods between 1995 and 2015. Given the limited data available, the current analysis could not identify significant effects on aggregate labour dynamics neither for rising imports from Eastern Europe or China, nor for rising exports to Eastern Europe. However, there is weak evidence that exports to China have facilitated employment growth, especially in high quality segments. Overall, these results add a cautious perspective to the discussion of import competition.

1 Introduction

Over the last two decades, industrialised countries have experienced a strong increase in trade with China. At the same time, trade relations between Western and Eastern European countries have grown substantially. The potential negative impact of the new competitors on economic performance has become a major concern in Western economies. This paper studies Austria, a small open economy, that has naturally served as a docking point for Eastern European countries because of its historical ties and geographical proximity. Its trade relations with Eastern Europe are at least as important as its trade with China. Eastern Europe is economically integrated with Austria in the Central European "manufacturing core" (Friesenbichler et al. 2018, Stehrer, Stöllinger 2015) where firms compete on a regulatory level playing field (Böheim, Friesenbichler 2016, Hölscher, Stephan 2009) and labour-intensive, low-cost segments have, especially since the -1990s, moved to Eastern Europe which changed the competitive positioning.

This paper asks whether Austria's local labour markets have been positively or negatively affected by increased trade with Eastern Europe and China. Its aim is to identify potential employment gains and losses due to increased trade with (i) China and (ii) the group of Eastern European countries. Furthermore, the analysis of trade data specifically focuses on different levels of quality. Vertical differentiation is used as a strategic instrument to alleviate competition (Gabszewicz et al. 1981, Shaked, Sutton 1982, 1987): We argue that specialisation plays a crucial role in the extent of trade competition and its impact on regional local labour markets.

In the remainder, we first provide an overview of the empirical literature and the established theoretical underpinnings for developing the hypotheses that we subsequently test empirically for Austria. Next, we provide descriptive statistics on the developments

that set the stage for the regression analysis using a regionalised trade dataset for Austria. Finally, we place the empirical results into a broader context.

2 Previous literature and conjectures

2.1 An overview of the empirical literature

There has been much debate in the empirical literature about the effects of increased imports on employment, especially from low-wage countries. While early studies, such as Grossman (1982), concluded that trade had little impact on US manufacturing employment, later literature showed that international trade flows play an important role for domestic labour markets. Bernard et al. found that rising imports from low-wage countries affected the reallocation of manufacturing within and across industries leading to lower employment growth in the US (Bernard et al. 2006). This negative impact of imports was particularly pronounced for low-skilled workers. Other segments of manufacturing may have even grown in response to strong international demand for US exports (Sachs et al. 1994)[1].

Another set of studies focuses on the impact of trade liberalisation, that is, policy changes. In the US, a strong relationship has been found between the decline in manufacturing employment in the early 2000s and the US granting of permanent normal trade relations with China, which prevented tariff increases (Pierce, Schott 2016). The impact of liberalisation on regional labour market outcomes has been mixed, depending on the magnitude of the tariff cuts (Kovak 2013), with long-term effects on wages more pronounced than short-term effects (Dix-Carneiro, Kovak 2017).

The rise of China in world trade motivated the analysis by Autor et al. (2013) who focused on the impact of trade competition from a low-wage country on regional US labour markets. Since regions differ in terms of specialisation and productivity, the impact of import competition can vary substantially across labour markets. The authors' diagnosis was straightforward: Between 1990 and 2007, rising imports from China caused higher unemployment and lower wages in regional labour markets that host industries exposed to import competing (Autor et al. 2013). The effects were larger in labour markets with more workers with less than a college education (Autor et al. 2015). The trade effects are stronger than the employment shifts caused by technological change. If industries facing high import competition in a local labour market contract, some other industries in the same region might expand and offset the negative employment effects. No significant employment gains in unexposed industries were found for the US (Acemoglu et al. 2016, Autor et al. 2016). Insignificant results for EU-regions have been reported by Hoelzl (2021), but based on very short time series.

In Europe, Chinese import growth is the main driver of international trade. The economic integration of Eastern European economies into the EU was another important component. However, these developments took place in slightly different phases. While China's rapid export growth took place in the 2000s, the Association Agreements (AA) with Eastern European countries were already in place in the mid-1990s. These led to an intensification of trade relations between Eastern Europe and the EU, in particular the industrialised countries of Central Europe. Several analyses of the impact of import competition based on European data support the findings for the US. Import penetration led to a reduction in manufacturing employment in Norway and a reallocation of labour from manufacturing to other sectors in Spain (Balsvik et al. 2015, Donoso et al. 2015). Dauth et al. (2014) examine the impact of the increased trade between Germany and 'the East' (i.e., China and Eastern Europe) on German local labour markets from the late 1980s onwards. There have been substantial job losses in German regions specialised in import-exposed industries. In contrast to the US, these losses have been more than offset by employment gains in regions specialising in export-oriented industries, driven mostly by the rise of Eastern Europe. These results contrast with the findings for the

[1] How import competition affects domestic firms also depends on the specific firm characteristics, such as firm size. Large European firms are found to be more sensitive to trade shocks from low-cost countries while small firms are more susceptible to increasing trade with other high-income countries (Colantone et al. 2014).

US, where offsetting employment gains in other industries have not materialised (Autor et al. 2016).

2.2 Conceptual underpinnings

International trade theory has undergone numerous developments, from classical to the neoclassical, new trade theories, and new classical trade theory. The classical theories are represented as country-based theories. Neoclassical International Trade Theory, often known as factor endowment theory, is represented by the model of Heckscher and Ohlin (HO), two Swedish economists, who developed the Factor Endowment Theory in the 1930s to replace Ricardo's theory of comparative advantage (Ricardo 1817) with numerous components. According to the HO Model international trade is mainly caused by the differential factor endowments of countries. It is advantageous to expose a country to international trade and allow its economy to specialise in accordance with its respective endowments. This typically is the core argument in favour for trade liberalisation and based on the HO model.

In the long run, however, the factor prices might not only be relatively, but also absolutely identical in both countries (Samuelson 1948). This 'factor price equalisation theorem' has often been the basis of opponents of free trade agreements who feared that wages in a high-wage country would fall to the level of the low-wage country, leading to a deterioration of real incomes in the high-wage country. However, due to cross-country differences in factor quality, technology and output prices factor price convergence has hardly been observed. In contrast, empirical evidence suggests a positive correlation between labour productivity and wages (Lam 2015).

At the regional level, the 'export base theory' assumes perfect elasticity of input supply and export demand and suggests that regional output and growth is determined by exogenous demand for a region's exports. Regional growth is positively affected by exports directly. Yet, regional income growth driven by rising export also increases demand for local products, which in turn further stimulates regional income growth. Some regions have developed an export base for manufactured goods due to spatial advantages, but this is not sufficient to ensure sustainable growth. Much of the "secondary" and "tertiary" industry will depend on the success of the export base. This resident industry will ensure that the export base continues to expand as a region develops (North 1955). An increase in demand for a region's exports leads to growing regional income and increased investment not only in the export industry, but also in various other types of economic activity, some of which become new export industries. As a result, the export base of the region tends to become more diversified. This also means that growth in the individual regions tends to be uneven. Ultimately, this model is likely to lead to more equal per capita incomes and a greater dispersion of output with long-term factor mobility.

In contrast, endogenous growth theory emphasises the importance of innovation and technological change. Economic growth depends on the rate of innovation, which in turn is affected by market competition, private investment in R&D, the protection of property rights and patents, and investment in human capital (education and training). Free trade policies can affect long-term growth by accelerating technological change (Grossman, Helpman 1990). Due to spillover effects associated with new technologies, endogenous growth theory suggests that different growth patterns can emerge from specialisation in different types of exports. While all regions can benefit from export growth, regions specialising in goods and services with greater spillover potential tend to grow faster than other regions (Leichenko 2000). However, Grossman, Helpman (1990) suggest that trade protection could accelerate growth if it shifts resources to manufacturing rather than R&D in countries that do not have a comparative advantage in R&D. Overall, from the perspective of endogenous growth theory, the effect of trade policy on long-term growth is an empirical question.

International trade and R&D provide opportunities for knowledge transfer through exports, but at the same time increase potential competition from imports. Firms in different industries show considerable heterogeneity in their ability to respond successfully to increasing trade openness (Chung, Alcácer 2002, Feinberg, Gupta 2004). The effect of exports and imports differs depending on how industries are positioned relative to

the global leader (Sakakibara, Porter 2001, Winston Smith 2014). According to modern trade theory, domestic firms producing products that can be easily replaced by inexpensive imports exit the market (Melitz, Ottaviano 2008). In contrast, more productive, technologically sophisticated firms avoid import competition through vertical upgrading. At the industry level, performance improves due to this sorting effect, but aggregate employment might decline due to firms' exit or the relocation of less productive firms to other, less competitive industries (Bernard et al. 2006).

Emerging economies, such as China, have benefited from the outsourcing of production by competitive, multinational firms to low-cost countries. Those multinational firms moved their know-how along with the production. This has reduced frictions in otherwise lengthy industrialisation processes. World market leaders are not necessarily distinguished by price-competitiveness, but above all by the technological content and quality of their goods and services (Baldwin 2016). As technological competencies in China have expanded quickly Chinese firms are increasingly competing on a low-wage, high-tech basis. Following the trade literature, the regional effects of increasing trade with China on domestic industrial performance and employment are contingent on the nature of trade. If a Chinese industry consists of leading firms that are internationally competitive due to their low price, know-how and the technological complexity of their product portfolio, increased import competition from China is expected to have a negative impact on the employment level of the domestic industry. If, on the other hand, the Chinese industry can produce at lower costs, but does not provide the same technological content as domestic firms, competitors can pursue a differentiation strategy by offering different quality levels and therefore escape direct competition (Shaked, Sutton 1982). In this case, increased imports of Chinese products are unlikely to have a negative impact on employment. Yet, quality differentiation can be beneficial for both domestic and foreign industries. This positive effect is more likely when domestic and foreign industries are located at different points in the value chain.

2.3 Conjectures

These considerations suggest differences in the nature of trade that induce different effects on regional labour markets. This leads us to the following conjectures:

Conjecture I: The aggregate effects of exports to Eastern Europe and China on regional labour markets are positive.

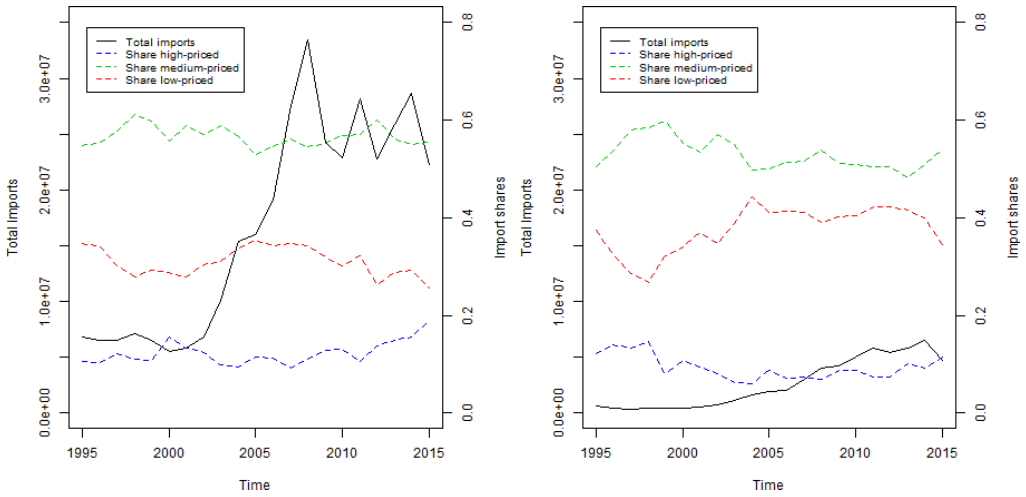
Conjecture II: The overall impact of imports from Eastern Europe and China on regional labour markets depends on their quality. The effect is negative for high-quality imports, while the effect of low-quality imports is negligible.

3 Rising trade with Central and Eastern Europe and China

More than the US economy, European countries have been affected by the increase in trade with Central and Eastern European economies, especially in run-up to and after the enlargement of the European Union in 2004, when eight countries (Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, and Slovenia) became EU members[2]. For Austria, a small open economy bordering Eastern Europe, trade with Eastern Europe has played a particularly important role in recent decades. Imports to and exports from Eastern Europe have grown exponentially since the late 1990s. The increase in trade value between Austria and Eastern Europe over time has been far greater than that of China (see Figure 1 and Figure 2).

The import values from Eastern Europe to Austria show a differentiated structure in terms of quality measured by prices at the product level (see Figure 1)[3]. By far the highest share (2010-2015: 58%) of imports from the Eastern European countries can be classified as medium quality, every fourth imported product is low-quality (2010-2015: 26%) and high-quality imports have the smallest share (2010-2015: 15%). However,

[2]In addition, two Mediterranean countries, Malta, and Cyprus, joined the EU in 2004.
[3]See section Data for the construction of price segments.



(a) Imports from Eastern Europe (b) Imports from China

Source: BACI, Eurostat price index at NACE-2-digit (2010=100), own calculations.
Notes: In thousand EUR, trade in services not included.

Figure 1: Imports to Austria from Eastern Europe and China between 1995 and 2015

the share of high-quality imports from the Eastern European countries has increased considerably since 2005. In contrast, Austria's share of middle-quality imports (2010-2015: 51%) from China and its share of low-quality imports (2010-2015: 40%) are much more comparable in size. However, the share of high-quality products from China in total imports is still very low (2010-2015: 9%) and has hardly increased over time.

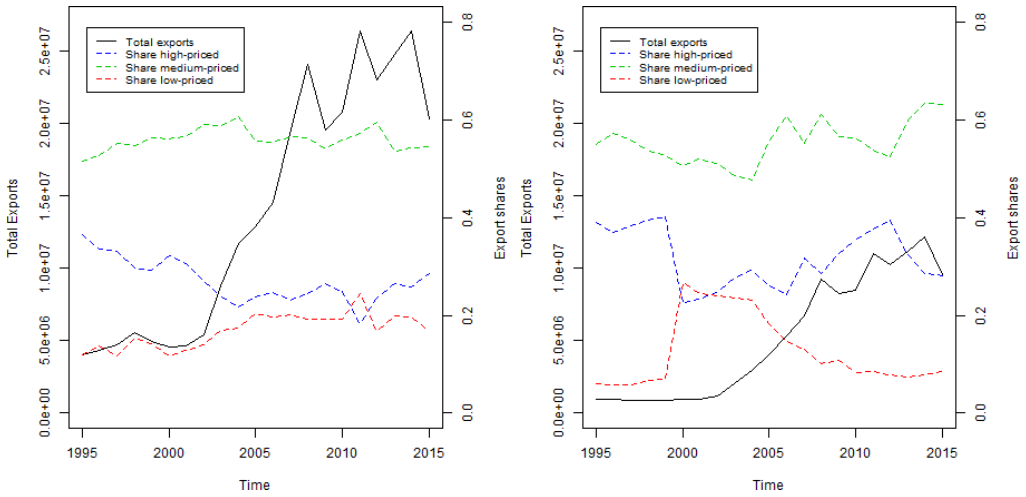
Eastern European economies, but also China, have been proven to be important target markets for Austrian firms. Export dynamics to both countries have gathered pace since the early 2000s (see Figure 2). However, there are differences in the quality of the goods exported to China versus Eastern Europe. Nearly two out of three products exported from Austria to Eastern Europe or China are in the medium price range[4]. However, there are differences with respect to the rest, (i.e., either low- or high-quality goods). For China, more than half of the remainder is comprised of high-quality goods (2010 – 2015: 33%), while the average share of high-quality exports to Eastern Europe is much lower (2010-2015: 24%).

Eastern Europe is a more important trading partner for Austria than China, although trade dynamics with both partners have increased noticeably since the mid-2000s. Most products imported from and exported to Eastern Europe and China are of medium quality (indicated by medium prices). Austria imports a larger share of high-price products from Eastern Europe than from China. Conversely, a higher share of exports to China consists of high-quality products compared to Eastern Europe. Cognisant of this evidence, we ask whether growing trade with these countries has affected Austrian local labour markets. We also study if and to what extent these effects differ according to the quality composition of the traded goods.

4 Empirical Approach and Identification Strategy

To estimate the effects of trade on local labour markets, we first define measures of import and export competition across labour market districts. Following previous literature (Autor et al. 2013, Dauth et al. 2014), our regionalised measures of the change of import and export competition ΔIC_{it}^{C} and ΔEC_{it}^{C} are calculated as:

[4]On average, between 2010 and 2015 about 60% of exports to Eastern Europe and 58% of exports to China consist of medium-priced products.



(a) Exports to Eastern Europe (b) Exports to China

Source: BACI, Eurostat price index at NACE-2-digit (2010=100), own calculations.
Notes: In thousand EUR, trade in services not included.

Figure 2: Exports from Austria to Eastern Europe and China between 1995 and 2015

$$\Delta IC_{it}^{C} = \sum_{j} \frac{E_{ijt}}{E_{jt}} \frac{\Delta IMP_{jt}^{AT \leftarrow C}}{E_{it}} \tag{1}$$

$$\Delta EC_{it}^{C} = \sum_{j} \frac{E_{ijt}}{E_{jt}} \frac{\Delta EXP_{jt}^{AT \rightarrow C}}{E_{it}} \tag{2}$$

where E_{ijt} is the number of employees in region i, industry j at period t, E_{jt} is the aggregate number of employees in industry j, and analogously E_{it} is the aggregate manufacturing employment in region i at time t. $\Delta IMP_{jt}^{AT \leftarrow C}$ and $\Delta EXP_{jt}^{AT \rightarrow C}$ are the changes in industry-specific Austrian imports from and exports to countries (C) such as China or Eastern Europe in real monetary terms (EUR) between time periods t and $t+1$. Thus, ΔIC_{it}^{C} and ΔEC_{it}^{C} capture the potential increase in import and export competition of an Austrian labour market district given its initial sectoral employment structure, since it distributes the national change in sectoral imports among the individual regions according to their shares in national sectoral employment[5].

Our basic regression specification to estimate employment effects at the regional level can be written as:

$$\Delta Emp_{it} = \alpha_0 + \beta_1 \Delta IC_{it}^{C} + \beta_2 \Delta EC_{it}^{C} + X_{it}^{'} \beta_3 + \epsilon_{it}, \tag{3}$$

where $t \in \{1995, 2005\}$, Δ indicates the change between the two 10-year sub-periods 1995-2005 and 2005-2015, and $i \in \{1, \ldots, 85\}$ represents the labour market districts in Austria. ΔEmp_{it} is the 10-year change in the share of manufacturing employment in a region's population in percentage points. $X_{it}^{'}$ is a set of start-of-period control variables varying over regions, such as the share of female workers and the share of ICT specialists employed in a given labour market district. ϵ_{it} depicts the error term, that is clustered at the level of labour market districts to account for spatial or serial correlation.

In a next step, we identify possible differences in the effects of import and export competition in terms of the quality levels of the traded products, focusing on high and low quality for the sake of brevity. Instead of solely looking at the total imports from

[5]To demonstrate the regional heterogeneity over time, Figure A.3 to Figure A.6 in the Appendix show the changes of manufacturing employment shares in Austrian labour markets between 1995 and 2005 and between 2005 and 2015.

and exports to Eastern Europe and China, we use the high-quality imports and exports to calculate high-quality trade competition measures:

$$\Delta IC_{it}^{C,high} = \sum_j \frac{E_{ijt}}{E_{jt}} \frac{\Delta IMP_{high,jt}^{AT \leftarrow C}}{E_{it}} \tag{4}$$

$$\Delta EC_{it}^{C,high} = \sum_j \frac{E_{ijt}}{E_{jt}} \frac{\Delta EXP_{high,jt}^{AT \rightarrow C}}{E_{it}}. \tag{5}$$

Our specification changes to

$$\Delta Emp_{it} = \alpha + \beta_1 \Delta IC_{it}^{C,high} + \beta_2 \Delta EC_{it}^{C,high} + X_{it}^{'} \beta_3 + \epsilon_{it}, \tag{6}$$

The same approach is used to estimate the effects of low-quality imports and export from and to Eastern Europe and China on regional employment in Austria. The effects for trade with China are estimated separately from the effects with Eastern Europe. Trade with Eastern Europe is defined as imports and exports for the country group consisting of Bulgaria, Czech Republic, Hungary, Poland, Romania, Slovakia, Slovenia, Estonia, Latvia, and Lithuania.

Changes in trade volumes could be the result of country- or region-specific demand shocks. Regional employment as well as imports might be positively correlated with unobserved shocks in Austrian product demand. In other words, changes in local labour markets may be the result of other developments than increasing trade with China and Eastern Europe. To identify the causal effect of increasing trade with China and Eastern Europe and account for potential endogeneity of Austrian trade exposure an instrumental variable approach (2SLS) is employed.

Following the approaches used by other papers on import competition (Autor et al. 2013, Bloom et al. 2019, Dauth et al. 2014), we use the composition and growth of Chinese and Eastern European imports from and exports to eight other high-income countries where no significant correlation between demand and supply shocks with Austria is expected. The eight developed non-Euro countries used for the instrumental variable approach are Australia, Canada, Japan, Norway, New Zealand, Sweden, Singapore, and the United Kingdom.

Moreover, to avoid issues in terms of measurement errors and reversed causality because of anticipated future trade competition we use 5-year lagged sectoral employment shares to calculate the instruments (see equations (7) and (8)).

$$\Delta \text{Inst.} IC_{it}^{C} = \sum_j \frac{E_{ijt-5}}{E_{jt-5}} \frac{\Delta IMP_{jt}^{\text{IV - Ctry} \leftarrow C}}{E_{it-5}} \tag{7}$$

$$\Delta \text{Inst.} EC_{it}^{C} = \sum_j \frac{E_{ijt-5}}{E_{jt-5}} \frac{\Delta EXP_{jt}^{\text{IV - Ctry} \rightarrow C}}{E_{it-5}}, \tag{8}$$

5 Data

We confine our analysis to the manufacturing sector. In the period analysed, Austria's imports and exports are dominated by goods rather than services (Reinstaller, Friesenbichler 2020). This may explain why manufacturing still is a very important sector in Austria compared to other high-income countries in Europe (Eurostat 2020). The trade data are obtained from BACI, which is a harmonised trade data set containing information on imports and exports (Gaulier, Zignago 2010). BACI provides information on the quantity of each traded product line at the HS92 6-digit level. However, BACI does not contain industry information. To match the trade data with the industry classification (NACE Rev. 2., 4-digit), we recode HS92 6-digit data to HS02, for which a NACE Rev. 1 correspondence table is available, which again can be transformed into NACE Rev. 2 data at the four-digit level. Unit values are obtained by dividing the export values by

the corresponding quantities[6]. For each year and each target market, (i.e., NACE 4-digit industries in different countries), these unit values are aggregated.

We study the impact of trade on regional labour markets. Unfortunately, trade information at a more disaggregated, regional level is unavailable. Hence, we regionalise trade flows according to equations (1) and (2). Against the backdrop of the trade-induced structural change discussion, we further use unit values as a proxy for product quality (Peneder 1999). Especially for trade relations with catching-up economies, product quality is a distinguishing characteristic and a vertical differentiation is a common reaction to competitive dynamics (Hombert, Matray 2018). We use unit values to divide trade flows into high-, and low-quality segments. The trade flows that belong to the upper 25% of the unit values are classified as high-quality exports. Analogously, the lowest 25% of the unit values are classified as low-quality exports. Since sectoral trade flows might be affected by outliers that increase volatility, we use a three-year average (1995-1997, 2004-2006 and 2013-2015) of imports and exports to determine structural differences between the two 10-year periods of interest (1995-2005 and 2005-2015)[7]. The analysis is restricted to trade in manufacturing goods.

The regional employment data are provided by the Federation of Austrian Social Insurance Institutions ('Hauptverband der österreichischen Sozialversicherungsträger') and are available for all industries at NACE Rev.2 4-digit level covering 85 different labour market areas ('Arbeitsmarktbezirk') in Austria[8]. Depending on the labour market and time, the changes in manufacturing shares vary significantly[9]. The changes in manufacturing shares do not follow a general trend across regions. The data rather show an increase in the manufacturing share in some of Austria's labour market districts, while others experience a decrease.

Over and above trade exposure, technological change may equally affect labour market dynamics. The literature has discussed two interrelated phenomena for which we control: automation of tasks and the rise in ICT. The effects of increasing automation on the labour force are controversially discussed (Arntz et al. 2016, Bowles 2014, Frey, Osborne 2017). According to Frey, Osborne (2017), 47% of jobs in the US are potentially at high risk of automation. Bowles (2014) transferred this approach to EU countries and calculated that in Austria more than half of all jobs could be affected by automation. However, rather than entire occupations, specific job tasks might be replaced, supported, or created. Using the task-based approach, an OECD Working Paper (Arntz et al. 2016) found that in Austria 12% of employees work in jobs with a high risk of automation. Manual routine jobs are decreasing, and abstract non-routine jobs are increasing in importance (Hölzl et al. 2019). We therefore control for the share of people employed in jobs mainly characterised by routine tasks at the labour-market district level (Peneder et al. 2016)[10].

The changing task structure has been linked to digitalisation (Hölzl et al. 2019). Recent results for Austria show that more ICT intensive economic structures positively affect firm-growth dynamics, which again have been linked to higher employment growth (Friesenbichler, Hölzl 2020). To capture the role of ICT; we apply an taxonomy (Peneder 2020) and compute the number of ICT professionals in different NACE 4-digit industries. We also use the share of regional employment in ICT-intensive industries as another control variable.

In addition, we control for the share of female employees in manufacturing. Since women working in manufacturing are more likely to have low-wage jobs, ceterus paribus,

[6]To exclude measurement errors the unit values are filtered using the filtering method proposed by Gaulier et al. (2008) for the price index calculation.

[7]We use a price index (2010=100) provided by Eurostat at NACE-2-digit level to gain real trade volumes.

[8]Some NACE 4-digit industries have been excluded from the analysis due to their lack of competition, such as mining support service activities (0900) or the postal activities under universal service obligation (5310).

[9]To demonstrate the regional heterogeneity over time, Figure A.1 and Figure A.2 in the Appendix show the change in import and export competition with Eastern Europe and China according to equations (1) to (5) across Austrian regions.

[10]The shares of manual routine and cognitive routine activities are combined into routine tasks per industry.

female workers are expected be more affected by trade shocks than their male colleagues (Autor et al. 2016). Table A.1 in the Appendix presents the summary statistics of all variables used in our regressions[11].

5.1 Data limitations

Employment data are provided by the Federation of Austrian Social Insurance Institutions. The dataset contains information on employers and the number of persons employed in the private sector in Austria (i.e., NACE Rev. 2 sectors A to N.), but the analysis is limited to the manufacturing sector. Self-employed and public-sector employees are not considered. At the firm level, the data are based on social security numbers, and contain the number of employees and the industry affiliation. The use of administrative data is preferable to surveys, because in a highly developed country like Austria the data quality can be assumed to be higher in official records. The number of employees is a figure reported to the social security authority instead of relying on recall information. The employment dataset used starts in 1974, but we restrict the sample to the period from 1995 through 2015 to maintain data comparability. Changes in the sector classifications and data coverage make it difficult to use data from before the mid-1990s. We construct a data set that reports annual employment stocks for all private sector firms with at least one employee at a given reference date[12]. 85 different labour market areas ('Arbeitsmarktbezirk') are covered. The analysis is based on the labour market definition used by the Federation of Austrian Social Insurance Institutions and the Public Employment Service Austria (AMS).

This approach has several disadvantages. First, if the effects of increasing trade with Eastern Europe on regional labour markets occurred before 1995 these are not covered in the analysis. Second, looking at the period between 1995 and 2015 implies that due to the introduction of the new industry classification (NACE Rev.2) in 2008/11 the transition from NACE Rev.1 to NACE Rev. 2 took place in the middle of the observation period. We use correspondence tables between NACE Rev.2 and Rev.1 to smooth the data, but for some industries differences in trade between 2005 and 2015 might be due to the NACE transition and thus distort the results. Third, a disadvantage of these administrative data is that they do not provide information on whether entities are enterprises or establishments. The anonymous firm identifiers in the social security files are administrative accounts. It is left at the discretion of the firm whether it chooses to report at the enterprise or the establishment level. A series of plausibility checks have been carried out to ensure that business units are properly defined. Most of the observations are small firms, which are likely to be at the enterprise level, because having one account reduces administrative burdens when reporting social security contributions (Stiglbauer et al. 2003). Moreover, the analysis is limited to manufacturing sector. While we know that the inconsistent use of enterprises and establishments in this dataset is a huge problem in industries such as retail or financial services, we are confident that it is a minor problem in the manufacturing sector. Despite the issues associated with the use of these employment data, there is no alternative for Austria that would provide both the length of time and the possibility of regionalisation.

6 Results

First, Table 1 shows the estimation results of equation (3). In columns (1) to (4) focus on the effects of import and export competition with Eastern Europe on Austrian labour markets, column (5) to (8) focus on import and export competition with China. OLS estimates are presented in columns (1), (3), (5), and (7). The other columns show

[11] The import and export competition measures are calculated according to equations (1) to (5). The maps in Figure A.3 to Figure A.6 depict the geographical distribution of the change in imports and exports from and to Eastern Europe and China in relation to employees according to equations (1) to (5) across Austrian regions. The brighter the region the higher the increase in import exposure between 1995 and 2005 or between 2005 and 2015 (Figure A.3 and Figure A.4). Similarly, the brighter the region the higher the increase in export possibilities over the same periods of time (Figure A.5 and Figure A.6).

[12] The reporting date is 31 December each year.

the 2-stage-least squares (2SLS) estimates using the instruments discussed above. The corresponding first-stage statistics for the quality of the instrumental variable approach is presented at the bottom of the table[13]. Further, we include the Durbin-Wu-Hausman test statistics. Despite previous literature and theory suggesting that import and export competition from Eastern Europe and China are endogenous in our model, the test statistics imply that our measures of import and export competition are exogenous in both models for Eastern Europe and China at a 10% significance level indicating that we can rely on the OLS estimates. Nonetheless, for completeness and comparability with previous literature, we still provide the 2SLS estimation results. All regressions are estimated with regional dummies.

Neither the OLS-regression, nor the instrumental variable estimations hint at any significant relation between changing regionalised import measures and 10-year changes in manufacturing employment in Austrian labour markets between 1995 and 2015. Our regressions suggest a weak correlation between export competition with China and the Austrian regional labour market, indicating that the increase in exports to China might have resulted in an increase in the share of manufacturing employment The coefficients are only significant at 10 percent level, though. In contrast, the results show no statistically significant effect of export competition with Eastern Europe on manufacturing employment. The coefficients of the regional manufacturing share at the starting period are significant and negative indicating that higher starting values of manufacturing shares are related to lower increases in the next ten years. The impacts of neither the share of manufacturing jobs dominated by routine tasks in 1995 and 2005 nor the share of female employees or of ICT-intensive industries in a region are significantly different from zero.

In a second step we test whether these results depend on the quality of imports from and exports to Eastern Europe and China measured by different price segments (high, and low prices). The estimation results of equation (6) are shown in Table 2. Again, columns (1), (3), (5), and (7) show OLS estimation results, while columns (3), (4), (6) and (8) show the results based on 2SLS regressions. In the high-quality segment, no significant effects of changes in import or export competition on regional employment can be observed, neither for Eastern Europe (columns (1) to (4)) nor for China (columns (5) to (8)). Similarly, for the low-quality segment, the results in Table 3 suggest no statistically significant correlation between changing import and export competition with Eastern Europe or China and the 10-year changes in manufacturing employment in Austrian labour markets between 1995 and 2015.

Overall, these regression results suggest that import competition has played only a minor role in labour market changes in Austria between 1995 and 2015. Neither the results for Chinese nor for Eastern European imports allow one to deduce serious effects on regional employment in Austria, regardless of the quality segment. Thus, the results do not support Conjecture II. The effects of export competition seem to be somewhat larger. Conjecture I is partly supported: While no effects of increasing export competition with Eastern Europe can be observed, our results indicate a positive correlation between increasing export competition with China and regional manufacturing employment in Austria.

7 Discussion

Previous results are largely available for countries such as the US or Germany. However, Austrian regions are more homogeneous in terms of their economic development and industry structure than German regions or regions in the United States. The differences in the regional industrial specialisation (e.g., the performance differences between German states in the "East" and "West" which continue to exist after the German reunification, or the "rust belt" as opposed to the ICT-intensive coastal areas in the US) are different from those in a small and rather homogeneous country such as Austria. Thus, the

[13]The Cragg-Donald test statistic suggests that the maximum bias of the 2SLS estimator will be no more than 10% of the bias of OLS at a 5% significance level. The Kleibergen-Paap Wald test statistic suggests that the maximum bias of the 2SLS estimator will be no more than 15% of the bias of OLS.

Table 1: Effects of Import and Export Competition with Eastern Europe and China on Manufacturing Employment in Austrian Labour Markets

	Dependent variable: *10-year change manufacturing employment/working age pop. in %-points*							
	Eastern Europe				China			
	OLS (1)	2SLS (2)	OLS (3)	2SLS (4)	OLS (5)	2SLS (6)	OLS (7)	2SLS (8)
Δ Import competition with ... (3-year average)	0.01	-0.04	-0.02	0.02	-0.03	-0.01	-0.06	-0.11
	(0.03)	(0.09)	(0.03)	(0.11)	(0.07)	(0.18)	(0.07)	(0.14)
Δ Export competition with ... (3-year average)	-0.01	0.09	-0.01	0.02	0.05+	0.07+	0.01	0.03
	(0.01)	(0.11)	(0.01)	(0.06)	(0.03)	(0.04)	(0.02)	(0.03)
Share of manufacturing jobs in total employment			-0.33***	-0.31***			-0.33***	-0.33***
			(0.09)	(0.07)			(0.08)	(0.07)
Share of employment in ICT-intensive industries			-0.02	0.00			0.01	0.01
			(0.05)	(0.08)			(0.05)	(0.06)
Share of routine jobs in manufacturing employment			0.09	0.03			0.08	0.07
			(0.19)	(0.15)			(0.17)	(0.12)
Share of female employees in manufacturing			-0.07	-0.08			-0.08	-0.09
			(0.07)	(0.09)			(0.07)	(0.07)
Constant	0.44	-4.06	2.08	2.14	-1.73	-2.64+	1.55	1.09
	(0.92)	(5.34)	(8.28)	(8.25)	(1.14)	(1.56)	(8.04)	(5.78)
Observations	170	170	170	170	170	170	170	170
Cragg-Donald Wald F statistic		11.63		10.13		12.86		9.46
Kleibergen-Paap Wald F statistic		5.47		4.29		5.81		5.29
Wu-Hausman p-value		0.06		0.12		0.29		0.15

Notes: Regional fixed effects included in all regressions. Instruments are based on the composition and growth of Chinese and Eastern Europe imports from and exports to eight other high-income non-Euro countries: Australia, Canada, Japan, Norway, New Zealand, Sweden, Singapore, and the United Kingdom. Clustered standard errors in parenthesis; + p<0.1, * p<0.05, ** p<0.01, *** p<0.001. Stock-Yogo weak ID test critical values: Acceptable level of bias= 10%: 7.03, Acceptable level of bias= 15%: 4.58, Acceptable level of bias= 20%: 3.95 (Stock, Yogo 2005)

Table 2: Effects of Competition in High–quality Imports and Exports from and to Eastern Europe and China on Manufacturing Employment in Austrian Labour Markets

	Dependent variable: *10-year change manufacturing employment/working age pop. in %-points*							
	Eastern Europe				China			
	OLS (1)	2SLS (2)	OLS (3)	2SLS (4)	OLS (5)	2SLS (6)	OLS (7)	2SLS (8)
Δ Import competition with ... (3-year average)	-0.02	0.28	-0.08	0.09	-0.24	-1.63	-0.40	-4.33
	(0.12)	(0.60)	(0.13)	(0.41)	(0.34)	(2.20)	(0.32)	(5.22)
Δ Export competition with ... (3-year average)	0.04	-0.18	0.01	-0.13	0.16	0.37	0.04	0.58
	(0.07)	(0.46)	(0.06)	(0.32)	(0.11)	(0.34)	(0.09)	(0.66)
Share of manufacturing jobs in total employment			-0.34***	-0.36***			-0.34***	-0.48*
			(0.09)	(0.09)			(0.08)	(0.19)
Share of employment in ICT-intensive industries			-0.01	0.00			-0.01	-0.05
			(0.04)	(0.03)			(0.04)	(0.09)
Share of routine jobs in manufacturing employment			0.09	0.13			0.10	0.29
			(0.18)	(0.16)			(0.16)	(0.30)
Share of female employees in manufacturing			-0.08	-0.09			-0.08	-0.13
			(0.07)	(0.06)			(0.07)	(0.13)
Constant	-0.60	2.56	1.61	2.18	-0.98	-2.07	1.01	-7.24
	(1.08)	(6.66)	(8.07)	(6.43)	(0.82)	(1.76)	(7.87)	(12.90)
Observations	170	170	170	170	170	170	170	170
Cragg-Donald Wald F statistic		3.79		2.50		3.79		3.75
Kleibergen-Paap Wald F statistic		1.27		1.57		0.63		0.72
Wu-Hausman p-value		0.61		0.74		0.37		0.00

Notes: Regional fixed effects included in all regressions. Instruments are based on the composition and growth of Chinese and Eastern Europe imports from and exports to eight other high-income non-Euro countries: Australia, Canada, Japan, Norway, New Zealand, Sweden, Singapore, and the United Kingdom. Clustered standard errors in parenthesis; + p<0.1, * p<0.05, ** p<0.01, *** p<0.001. Stock-Yogo weak ID test critical values: Acceptable level of bias= 10%: 7.03, Acceptable level of bias= 15%: 4.58, Acceptable level of bias= 20%: 3.95 (Stock, Yogo 2005)

Table 3: Effects of Competition in Low–quality Imports and Exports from and to Eastern Europe and China on Manufacturing Employment in Austrian Labour Markets

	Dependent variable: *10-year change manufacturing employment/working age pop. in %-points*							
	Eastern Europe				China			
	OLS (1)	2SLS (2)	OLS (3)	2SLS (4)	OLS (5)	2SLS (6)	OLS (7)	2SLS (8)
Δ Import competition with ... (3-year average)	-0.02	-0.01	0.03	0.12	-0.09	0.44	-0.16	0.16
	(0.05)	(0.16)	(0.05)	(0.21)	(0.15)	(0.35)	(0.14)	(0.34)
Δ Export competition with ... (3-year average)	0.06	0.38	0.06	0.25	-0.05	0.04	-0.01	0.03
	(0.08)	(0.32)	(0.06)	(0.19)	(0.13)	(0.05)	(0.06)	(0.04)
Share of manufacturing jobs in total employment			-0.33***	-0.34***			-0.33***	-0.32***
			(0.09)	(0.08)			(0.08)	(0.07)
Share of employment in ICT-intensive industries			0.01	0.05			0.01	-0.02
			(0.05)	(0.06)			(0.05)	(0.05)
Share of routine jobs in manufacturing employment			0.06	0.02			0.07	0.08
			(0.18)	(0.13)			(0.18)	(0.13)
Share of female employees in manufacturing			-0.08	-0.11			-0.08	-0.05
			(0.07)	(0.07)			(0.06)	(0.07)
Constant	-0.41	-3.11	1.79	1.47	0.88	-1.15	2.37	0.99
	(0.72)	(2.64)	(8.30)	(6.34)	(1.64)	(1.04)	(8.09)	(6.40)
Observations	170	170	170	170	170	170	170	170
Cragg-Donald Wald F statistic		17.34		16.36		12.46		7.36
Kleibergen-Paap Wald F statistic		8.30		6.07		3.29		2.13
Wu-Hausman p-value		0.05		0.07		0.14		0.33

Notes: Regional fixed effects included in all regressions. Instruments are based on the composition and growth of Chinese and Eastern Europe imports from and exports to eight other high-income non-Euro countries: Australia, Canada, Japan, Norway, New Zealand, Sweden, Singapore, and the United Kingdom. Clustered standard errors in parenthesis; + p<0.1, * p<0.05, ** p<0.01, *** p<0.001. Stock-Yogo weak ID test critical values: Acceptable level of bias= 10%: 7.03, Acceptable level of bias= 15%: 4.58, Acceptable level of bias= 20%: 3.95 (Stock, Yogo 2005)

regional analysis of Austria is based on a smaller number of less heterogeneous observations than in the case of the US or Germany. Moreover, Austria's trade integration is deep and some of its major industries like the manufacturing of machinery and transport equipment are important suppliers for industries in Germany and other countries. However, indirect effects of changes in import competition in these customer countries are not covered by the present analysis.

When interpreting the result for Austria, some notable institutional differences should be considered. The Austrian labour market is more rigid than the US labour market (Lithuania Free Market Institute 2019). The Austrian system of 'economic and social partnership' is characterised by a high degree of corporatism, involving economic chambers and trade unions in collective wage-bargaining and the parts of the content of labour market policies. Taken together, these factors may explain why, compared to Germany or the US, there are no large effects of trade competition at the regional level.

The Austrian industry is characterised by a high share of small firms. According to the Structural Business Statistics provided by Statistics Austria, 69.9% of the manufacturing firms employed fewer than ten people in 2015. Only 1.8% of the firms reported more than 250 employees. According to literature, small and medium-sized firms are less sensitive to trade shocks from low-cost countries than large firms (Colantone et al. 2014). Furthermore, small firms tend to compete in more protected niche markets (Porter 1980, Spanos et al. 2004). In other words, replacement effects that underlie the argument may not be present. Imports from Eastern Europe are often complementary products in regional value chains (Friesenbichler et al. 2018, Stehrer, Stöllinger 2015). It is possible that Chinese products are targeting global markets rather than small niche markets. Thus, even though the products are in the same industry class, they could be targeting different demand groups.

Peneder (1999) demonstrates that Austria's industrial pattern is most unusual compared to other high-performing countries. While the US and Germany have been characterised by high shares of technology-driven industries, Austria has a high share of mainstream manufacturing combined with a low share of technology-driven industries. However, compared to other countries these 'traditional' industries in Austria are rather innovative in terms of patents and R&D. Within mainstream manufacturing Austria clearly outperformed countries with comparably high manufacturing shares: 'The fact that in 1997, the labour productivity of total manufacturing in Austria was 46 percent above that of Spain and 69 percent above that of Portugal illustrates that similar patterns of specialisation can still comprise very different kinds of activities' (Peneder 1999, p. 244). This might explain the differences of the impact of trade competition with China on local labour markets between countries with comparable industry structure, such as the labour intensive economy of Spain (Donoso et al. 2015). Also, the insignificant effects of trade competition from Eastern Europe and China on regional Austrian labour markets could be due to specialisation in different market segments within NACE 4-digit industry classes which is not limited to vertical differentiation and therefore not captured by using unit values to identify different quality segments. In other words, the level of industry aggregation (NACE 4-digit) might be still too high to identify any significant effects of import competition on local labour markets.

In addition, the exposure of employment-intensive industries to trade has been rather small. The descriptive statistics show that imports from Eastern Europe and China tend to be in NACE 4-digit industries that are rather small in terms of employment shares[14]. While the growth of imports in these industries is noteworthy, the respective Austrian employment shares are small in 1995 and 2005. The same holds for the industries with the highest growth rates of imports from China between 1995 and 2015[15]. Except for sawing

[14]Figure A.7 and Figure A.8 show the NACE 4-digit sectors with the highest increases in imports from Eastern Europe between 1995, 2005 and 2015. The growth of imports from Eastern Europe was the largest in 'Manufacture of watches and clocks' (2652), 'Manufacture of imitation jewelry and related article' (3213) and 'Precious metals production' (2441) between 1995 and 2005, and in 'Manufacture of cider and other fruit wine' (1103), 'Precious metals production' (2441) and 'Manufacture of ice cream' (1052) between 2005 and 2015.

[15]Figure A.9 and Figure A.10 illustrate that between 1995 and 2005 import growth from China was the highest in 'Sawmilling and planing of wood' (1610), 'Manufacture of musical instrument' (3220)

and planing (NACE 1610: employment share of 1.6% in 1995) and the manufacturing of beer (NACE 1105: employment share of 0.75% in 2005), all industries showed shares in manufacturing employment significantly below 0.5% in 1995 and 2005 (the average employment share of a sector was about 0.5% in both years). Another noteworthy exception is the 'Production of meat and poultry meat products' (1013), which accounted for about 2.2% of all employees in manufacturing in 2005. At the same time, between 2005 and 2015 this industry had the fourth highest change in imports from Eastern Europe and its imports from China have grown drastically. However, in 2015 still 2.14% of manufacturing employees worked in the production of meat and poultry meat product. Similarly, the employment share of sawing and planing was in 2015 at the same level (1.6%) as in 1995. Only employment in the manufacturing of beer show a relative decline from 0.9% in 1995 to 0.4% of total manufacturing employment in 2015.

In contrast, looking at the largest industries in terms of manufacturing employment in Austria shows that in these industries the increase in imports was significantly lower. It ranged from -22% to +483% for imports from Eastern Europe and between -1% and +299% for imports from China[16]. Considering the median change in imports between 1995 and 2005 from Eastern Europe was 125% (2005-2015: 31%) and from China 530% (2005-2015: 217%), the increases in imports in the largest Austrian manufacturing industries, particularly from China, are rather small. Even after removing the most extreme outliers (which are all characterised by extremely high import growth rates in very small industries), the relationship between import growth rates and employment shares is negative, although mostly statistically insignificant. For Chinese imports between 1995 and 2005, there is a significant negative correlation between manufacturing employment shares and import growth. This suggests that the strongest Chinese import growth took place mostly in Austrian industries that were already very small in 1995.

A study for the US finds that internal migration is affected by changes in import competition from China (Greenland et al. 2019). Due to increasing trade with China, population adjustments appear especially dynamic in local labour markets that are most exposed to import competition from China. A decline in regional population growth tends to materialise seven to ten years after the trade-enhancing policy change occurred. It mainly affects young and the less educated. Our dependent variable, ΔEmp_{it}, is calculated as the 10-year change in the share of manufacturing employment in a region's population in percentage points. Thus, our left hand side variable might be affected by a trade-induced change in population growth and causal identification of the effects is confounded. Failure to account for changes in the composition of the labour force may lead to biased estimates of the impact of trade on average outcomes at the level of commuting zones, such as wages or unemployment rates (Greenland et al. 2019, p. 49). This bias is most likely negative in the sense that previous studies might underestimate the effects of import competition from China on US labour markets. Indeed, if regional population growth in Austria was similarly or even more affected by trade competition from Eastern Europe and/or China, this might explain the lack of significant effects of import competition on regional employment to some extent.

8 Conclusions

Austria, a small, industrialised, open economy in Central Europe, has experienced two waves of economic integration in recent decades: one with Eastern Europe and one with China. This paper asked if imports from and exports to both China and Eastern Europe have affected regional labour markets in two ten-year periods: one between 1995 and 2005 and one between 2005 and 2015. Neither increases in imports from nor exports to

and 'Manufacture of jewelry and related article' (3212). From 2005 to 2015 the highest increases were observed in 'Manufacture of homogenised food preparations and dietetic food' (1086), 'Manufacture of beer' (1105) and 'Manufacture of knitted and crocheted hosiery' (1431).

[16] In 1995, the largest Austrian manufacturing sectors having a share in manufacturing employment above 3% were 'Manufacture of other furniture' (31.09), 'Manufacture of bread; manufacture of fresh pastry goods and cake' (1071) and 'Manufacture of basic iron and steel and of ferro-alloy' (2410). In 2005, besides 'Manufacture of other furniture' (31.09), and 'Manufacture of bread; manufacture of fresh pastry goods and cake' (1071), 'Manufacture of motor vehicle' (29.10) had a share of more than 3% of all employees in manufacturing (see Figure A.11 and Figure A.12 in the Appendix).

Eastern Europe have had a significant impact on aggregate labour dynamics. Austria seems to have benefited from the emerging "manufacturing core" in Central and Eastern Europe since 1990 (Stehrer, Stöllinger 2015) and fears of job losses are not visible, at least in aggregate dynamics. The data also show no significant impact from rising imports from China, either. However, there is some evidence that exports to China facilitate employment growth, especially in high-quality segments.

However, competitive pressure, especially from Chinese products, may follow a stage model in which the aggregate effects on the labour market occur last. Before the aggregate effects become visible, there are firm-level effects such as a decline in firms' competitiveness or firm exits in industries competing with China (Branstetter et al. 2019). Prior to firm-level changes in employment stocks, firms react in their strategic behaviour. Austrian firms have been shown to adjust their strategies in response to international competition. Even small changes in exposure to Chinese competition have a significant impact on diversification decisions. Firms exposed to increasing Chinese competition are more likely to diversify their geographical markets, but less likely to diversify their product portfolio or broaden their competence base (Friesenbichler, Reinstaller 2022, 2023). If Chinese growth continues, the pressure of Chinese import competition could eventually be reflected in labour market figures.

Nevertheless, these results put the current discussion about import competition into perspective. Neither increased internationalisation with China nor European economic integration with Eastern Europe has (negatively) affected Austrian labour markets to an extent that would be visible in aggregate terms. This is also true for the control variables. There are labour market dynamics in terms of the demand for tasks, and manual, routine tasks have become rarer. However, this has not affected the aggregate results.

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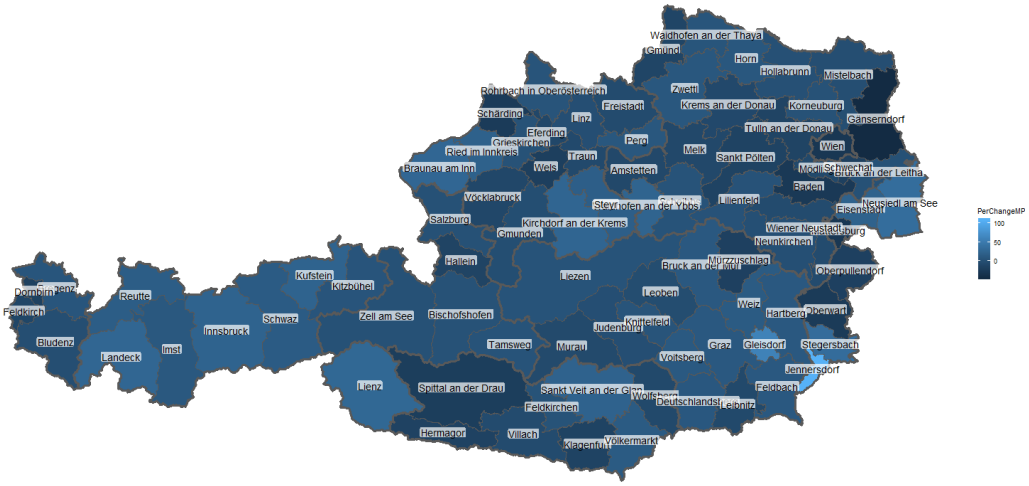
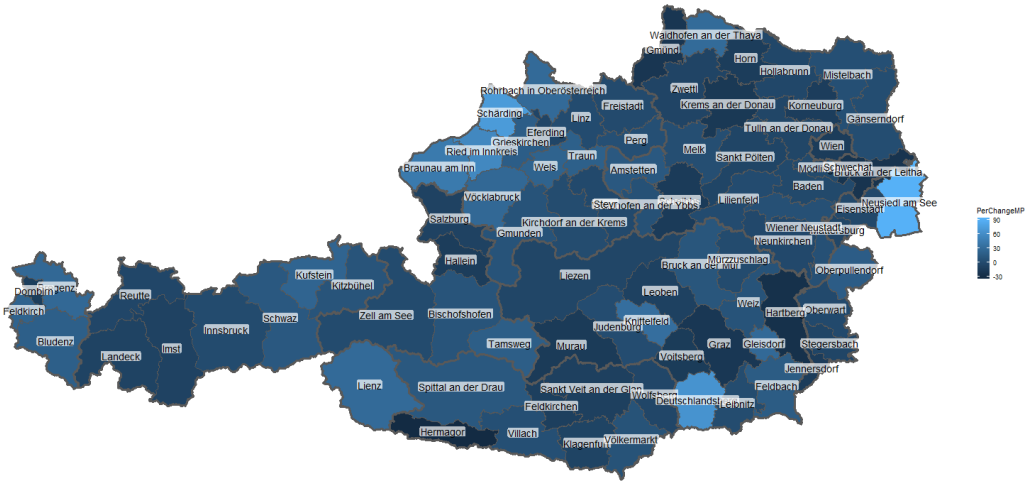
A Appendix:



Notes: The brighter the region the higher the increase in manufacturing employment shares between 1995 and 2005.

Figure A.1: Changes of manufacturing employment shares in Austrian labour markets ('Arbeitsmarktbezirke') between 1995 and 2005 (in %)



Notes: The brighter the region the higher the increase in manufacturing employment shares between 2005 and 2015

Figure A.2: Changes of manufacturing employment shares in Austrian labour markets ('Arbeitsmarktbezirke') between 2005 and 2015 (in %)

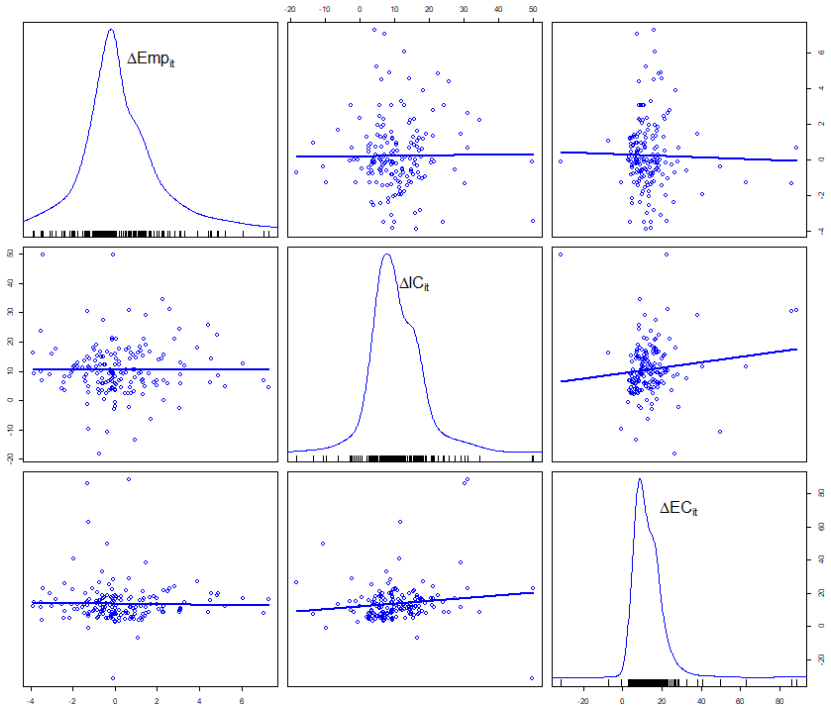


Figure A.3: Scatterplot of the main variables for Eastern Europe

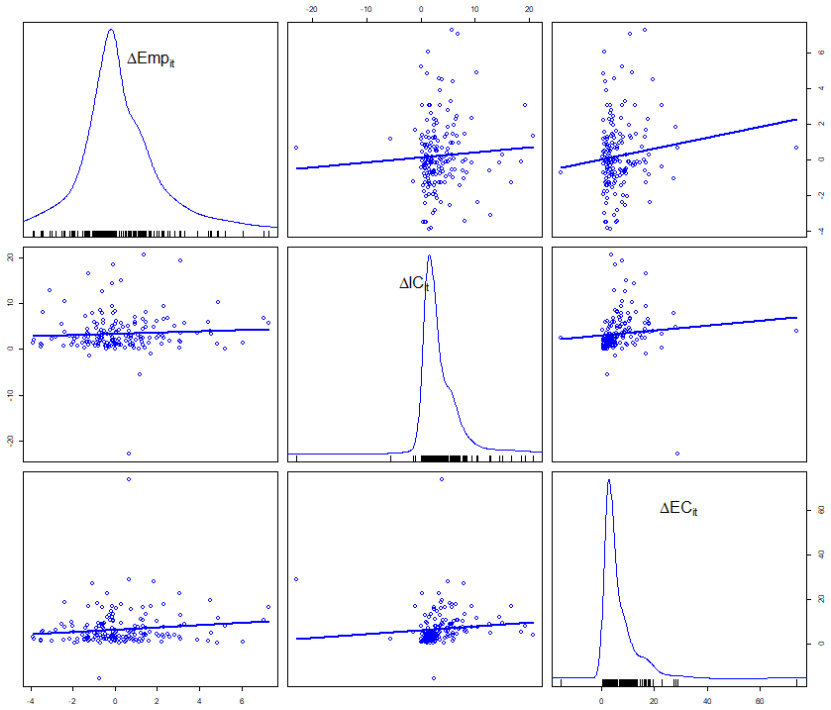
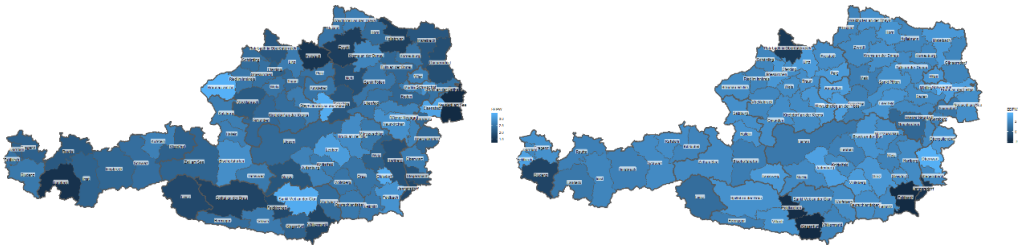


Figure A.4: Scatterplot of the main variables for China

Table A.1: Summary statistics

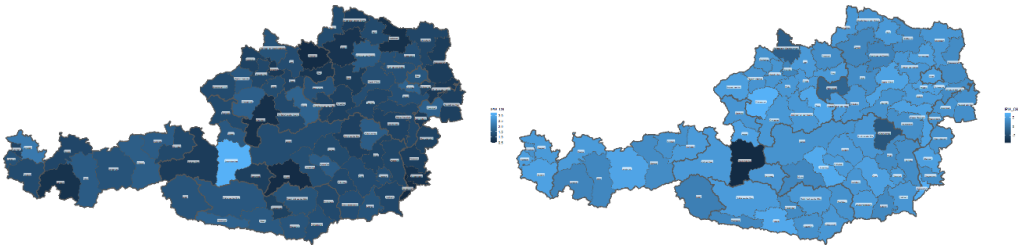
Variables	N	Mean	Std. Dev.	Min	Max
Change of Manufacturing employment shares in percentage points (population based)	170	0.25	1.95	-3.91	7.29
Change in import competition with Eastern Europe	170	10.69	9.03	-18.18	49.77
Change in export competition with Eastern Europe	170	13.78	12.09	-31.33	88.70
Change in high-quality import competition with Eastern Europe	170	2.44	2.47	-2.37	13.37
Change in high-quality export competition with Eastern Europe	170	3.86	4.12	-0.46	34.98
Change in low-quality import competition with Eastern Europe	170	1.95	3.39	-6.74	15.25
Change in low-quality export competition with Eastern Europe	170	2.26	2.70	-6.39	20.65
Change in import competition with China	170	3.49	4.28	-22.89	20.67
Change in export competition with China	170	6.86	7.85	-15.15	73.91
Change in high-quality import competition with China	170	0.41	0.82	-1.15	9.57
Change in high-quality export competition with China	170	2.28	2.32	-1.60	11.74
Change in low-quality import competition with China	170	1.31	1.62	-8.26	9.85
Change in low-quality export competition with China	170	0.56	2.18	-3.33	26.25
Share of manufacturing jobs in total employment	170	27.18	9.89	9.10	58.15
Share of ICT-intensive industries in manufacturing employment	170	27.90	15.05	1.27	68.20
Share of routine jobs in manufacturing employment	170	47.82	3.22	38.77	56.47
Share of female employees in manufacturing employment	170	27.24	6.48	13.05	59.65
Change in instrument for import competition with Eastern Europe	170	40.49	41.13	2.54	284.32
Change in instrument for export competition with Eastern Europe	170	16.10	16.82	-60.52	98.87
Change in instrument for high-quality import competition with Eastern Europe	170	12.17	17.85	-0.66	192.09
Change in instrument for high-quality export competition with Eastern Europe	170	1.72	2.44	-3.89	22.26
Change in instrument for low-quality import competition with Eastern Europe	170	7.08	8.99	-24.25	70.01
Change in instrument for low-quality export competition with Eastern Europe	170	5.53	7.39	-33.89	38.65
Change in instrument for import competition with China	170	286.28	406.09	-60.10	4422.10
Change in instrument for export competition with China	170	138.47	173.09	-466.25	1019.77
Change in instrument for high-quality import competition with China	170	82.45	86.54	-15.65	867.99
Change in instrument for high-quality export competition with China	170	14.09	21.63	-9.15	122.68
Change in instrument for low-quality import competition with China	170	33.96	134.30	-103.72	1612.11
Change in instrument for low-quality export competition with China	170	50.08	97.90	-277.19	1044.91



(a) 1995-2005 (b) 2005-2015

Notes: The brighter the region the higher the increase in import exposure between 1995 and 2005 or between 2005 and 2015.

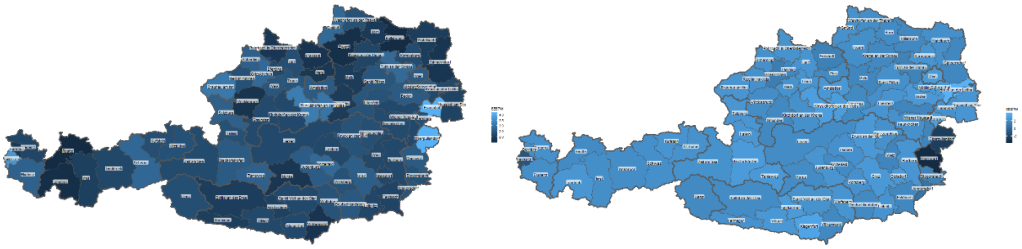
Figure A.5: Change in regionalised import competition with Eastern Europe



(a) 1995-2005 (b) 2005-2015

Notes: The brighter the region the higher the increase in import exposure between 1995 and 2005 or between 2005 and 2015

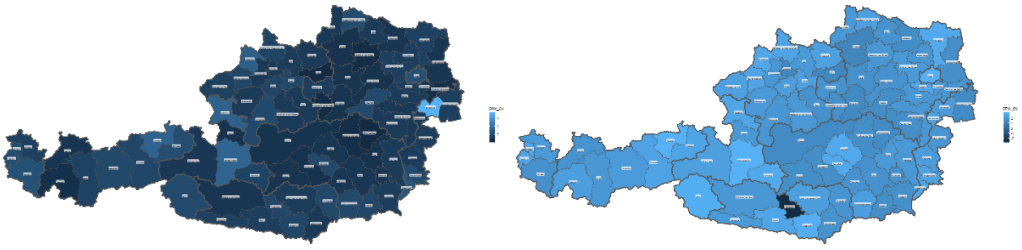
Figure A.6: Change in regionalised import competition with China in 1995-2005 (left) and 2005-2015 (right)



(a) 1995-2005 (b) 2005-2015

Notes: The brighter the region the higher the increase in export possibilities between 1995 and 2005 or between 2005 and 2015.

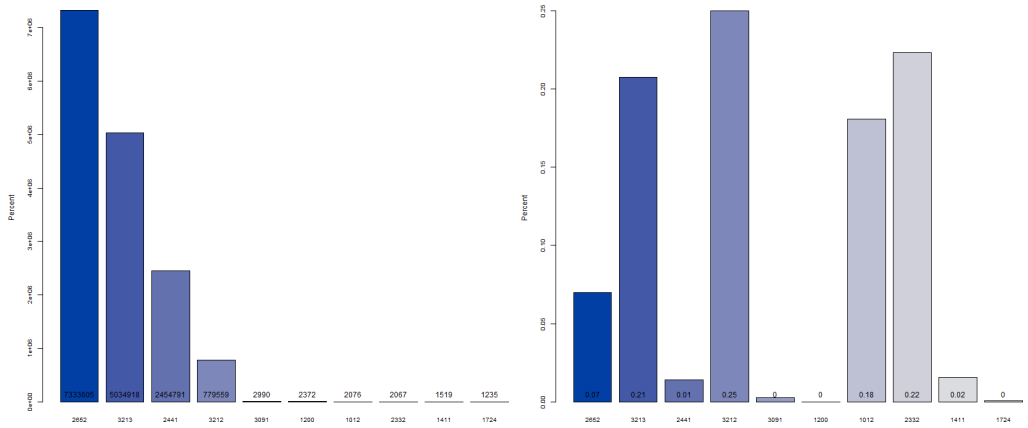
Figure A.7: Change in regionalised export competition with Eastern Europe in 1995-2005 (left) and 2005-2015 (right)



(a) 1995-2005 (b) 2005-2015

Notes: The brighter the region the higher the increase in export possibilities between 1995 and 2005 or between 2005 and 2015.

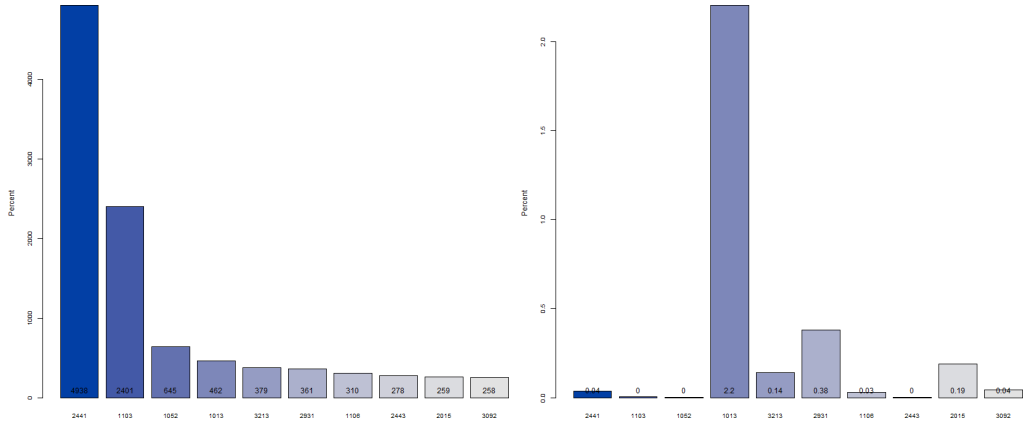
Figure A.8: Change in regionalised export competition with China in 1995-2005 (left) and 2005-2015 (right)



(a) Top10 changes in imports from Eastern Europe 1995-2005

(b) Employment shares in 1995

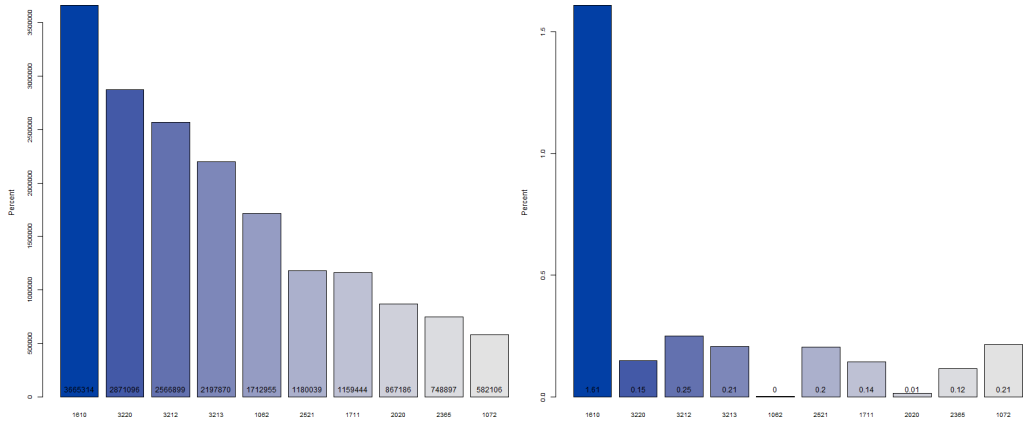
Figure A.9: Top10 import growth rates from Eastern Europe between 1995 and 2005 (left) and sectoral employment shares in 1995 (right), in %



(a) Top10 changes in imports from Eastern Europe 2005-2015

(b) Employment shares in 1995

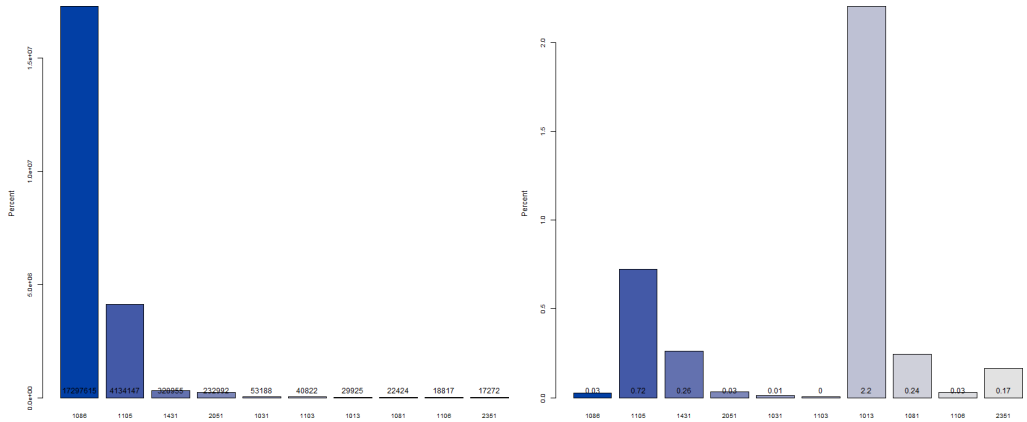
Figure A.10: Top10 import growth rates from Eastern Europe between 2005 and 2015 (left) and sectoral employment shares in 2005 (right), in %



(a) Top10 changes in imports from China 1995-2005

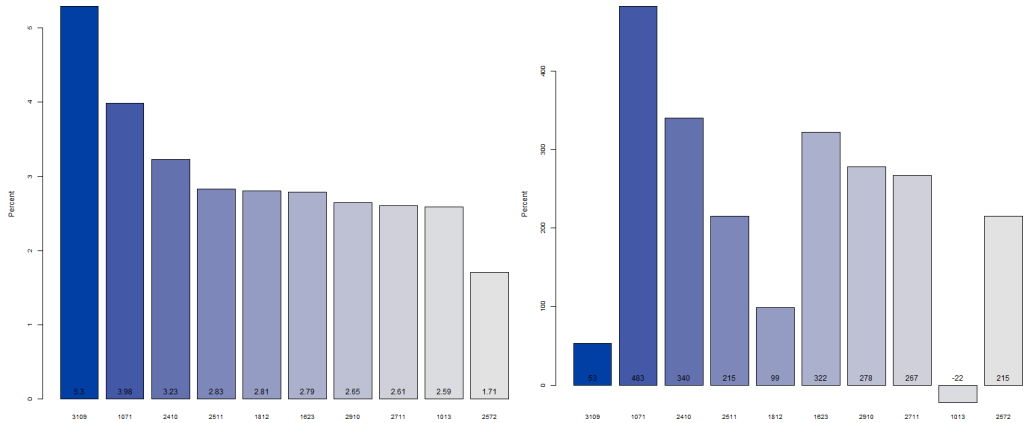
(b) Employment shares in 1995

Figure A.11: Top10 import growth rates from China between 1995 and 2005 (left) and sectoral employment shares in 1995 (right), in %



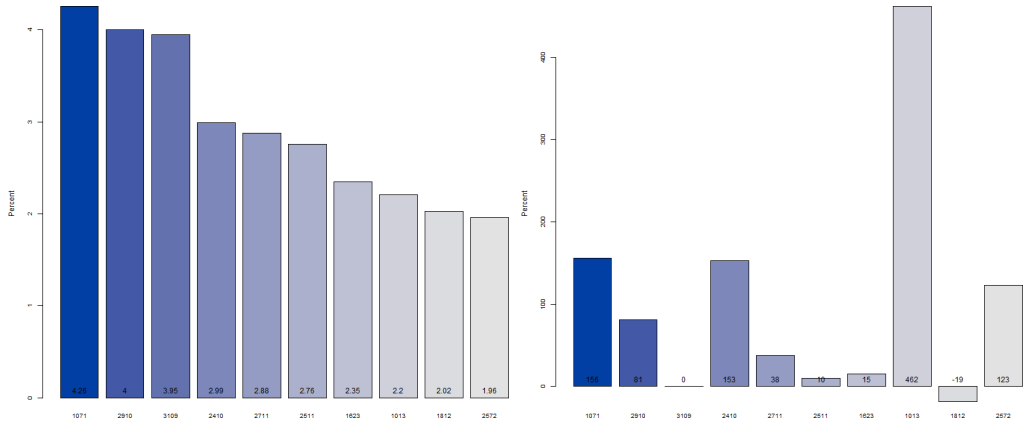
(a) Top10 changes in imports from China 2005-2015 (b) Employment shares in 2005

Figure A.12: Top10 import growth rates from China between 2005 and 2015 (left) and sectoral employment shares in 2005 (right), in %



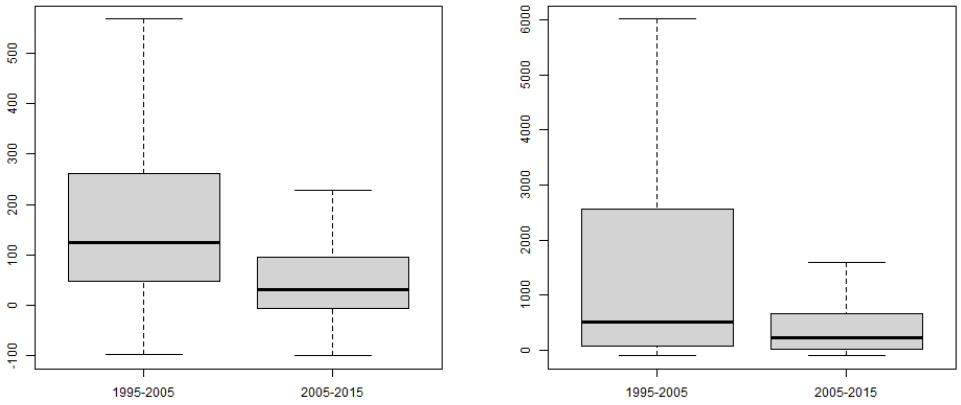
(a) Top10 employment shares in 1995 (b) Changes in imports from Eastern Europe 1995-2005

Figure A.13: Top10 largest industries in 1995 (left) and their changes in imports to Eastern Europe 1995-2005 (right), in %



(a) Top10 employment shares in 2005 (b) Changes in imports from Eastern Europe 2005-2015

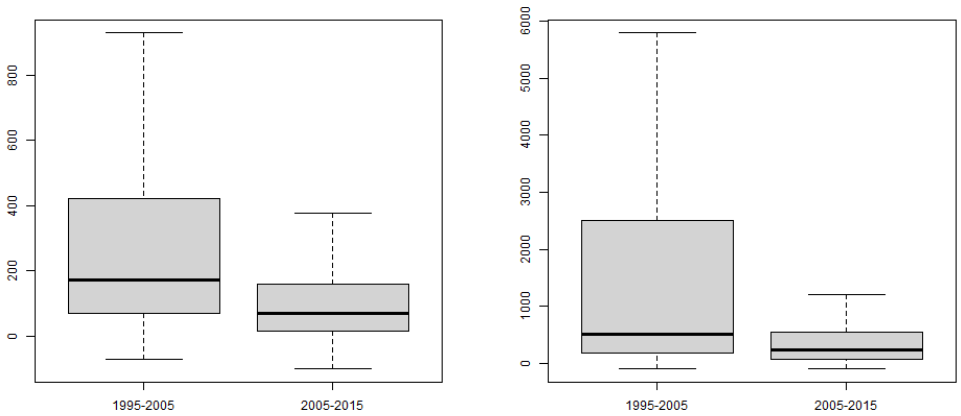
Figure A.14: Top10 largest industries in 2005 (left) and their changes in imports to Eastern Europe 2005-2015 (right), in %



(a) Eastern Europe (b) China

Notes: The whiskers are calculated as the distance of 1.5 times the interquartile range Outliers from above the upper quartile and below the lower quartile. All other observed data points outside the boundary of the whiskers are not plotted.

Figure A.15: Boxplot of percentage change in sectoral imports from Eastern Europe and China



(a) Eastern Europe (b) China

Notes: The whiskers are calculated as the distance of 1.5 times the interquartile range Outliers from above the upper quartile and below the lower quartile. All other observed data points outside the boundary of the whiskers are not plotted.

Figure A.16: Boxplot of percentage change in sectoral exports to Eastern Europe and China