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Trade, Institutions and Export Specialization

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Trade, Institutions and Export Specialization

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Abstract

This paper studies whether trade integration between the EU15 and Central Europe has led to more export specialization in Central Europe. Moreover, we analyze the impact of institutional reforms in Central Europe on export specialization. The empirical analysis is set up for thirteen Central European countries over the period 1989-2000. Our results indicate that a reduction in tariffs between EU15 and Central Europe led to increased export specialization in Central Europe. In addition to trade integration, we show that institutional reforms and in particular enterprise reforms contributed to export specialization.

Keywords: trade integration, tariffs, Herfindahl index, exports, institutions
JEL classification: F14, F15, R12
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1 Introduction

Before 1989, trade amongst Central and Eastern European countries (CEECs) was centrally planned and international trade openness was low. The fall of the Berlin wall in 1989 led to the collapse of these artificial trade relations amongst Central and Eastern European countries. This event was the start of a long process during which Central and East European countries had to adapt their economic, political and institutional situation to the standards of a market economy. Trade flows rapidly re-orientated to the EU. As a consequence, the EU15 became the main trade partner of Central and Eastern Europe. The process of trade integration between Central and Eastern Europe and the EU15 during the nineties offers us a unique opportunity to analyze the empirical relationship between trade integration and export specialization. In addition, the institutional changes in Central and Eastern Europe allow us to study the impact of two types of institutional reforms on export specialization. Note that this paper is not a sectoral study, but will analyze the effects of trade integration and institutional reforms on export specialization in Central and Eastern Europe during the period 1989-2000.

Export specialization is an important issue because it makes countries more dependent on a few industries and thus increases the risk of a sector-specific shock (Koren & Tenreyro 2004). Since 12 of the 13 Central and East European countries[1] in our sample became EU members in 2004 and 2007, their exposure to sector-specific shocks is of great interest to the EU15 as well. In addition to gradually declining EU15 tariffs on Central and East European exports, we also take into account two types of institutional reforms: enterprise reforms and competition policy reforms. Enterprise reforms focus on credit and subsidy policies for firms, while competition policy reforms deal with market entry and market dominance. Both measures of institutional reforms are an indication to what extent a country's policies and insti-

[1]Our sample consists of Poland, Hungary, Czech Republic, Slovenia, Slovakia, Malta, Cyprus, Estonia, Latvia, Lithuania, Bulgaria, Romania and Turkey.

tutions are restructured from planned-economy to market-economy based standards. Both tariffs and institutions can affect a country's exports flows. We observe that the average export specialization in Central Europe is not a monotonic process. Our Herfindhal index of export specialization increased sharply in the beginning of the nineties. After 1992, average exports in Central Europe diversified, while from 1997 onwards export specialization increased again. The aim of this paper is to analyze whether trade integration and institutional reforms can explain the pattern of export specialization that we observe in the data. Using a dynamic panel model, the long- and short-run effects of changes in tariffs with the EU15 on changes in export specialization in Central Europe can be disentangled. This is important because a shock in tariffs cannot be expected to have the same immediate and long-run effect on export specialization (Trefler (2004) and Beine & Coulombe (2007)).

Our results indicate that trade integration with the EU15 increases export specialization in Central Europe only in the long-run. Institutional reforms stimulate export specialization as well. The results show that enterprise reforms such as restructuring credit, subsidy and bankruptcy policies towards more market-economy standards, increase the degree of export specialization significantly. An increase on the performance of enterprise reforms of 1 unit, increases export specialization by 28%.

The paper is organized as follows. Section 2 reviews the related literature on the relationship between trade integration, institutions and export specialization, while section 3 shows some stylized facts. Section 4 explains the methodology and section 5 describes the data. Section 6 discusses the benchmark results and robustness checks. Finally, section 8 discusses the results and section 9 briefly concludes.

2 Related Literature

2.1 Trade Integration and Export Specialization

Traditional trade theories have shown that trade liberalization results in increasing specialization in sectors where a country has a comparative advantage because of differences in technology or factor endowments between countries. Also new trade theories predict that countries specialize in sectors which are subject to economies of scale. Trade liberalization decreases the number of varieties of goods in a country to cut down on their average costs. According to the new economic geography theory, when trade costs decrease, firms will choose a location where they find a higher demand for their products and where they find the largest pool of intermediate good producers. Proximity to suppliers and consumers reduces trade costs and may generate external economies of scale. As a consequence, regional specialization increases when trade costs are reduced (Amiti (1999), De Bruyne (2004) and Baldwin et al. (1999)).

The empirical literature provides evidence of increasing specialization in Western Europe ((Amiti 1999), (Brulhart 1998)) and Central and Eastern Europe (Traistaru et al. (2003) and Hildebrandt & Wörz (2004)). Traistaru et al. (2003) came to the conclusion that trade integration leads to higher regional specialization in five Eastern European countries[2] during the period 1990-1999. Similarly, the study by Hildebrandt & Wörz (2004) shows for 8 Central and Eastern European countries[3] greater industrial specialization during the period 1993-2000. One drawback of these studies is that usually trade integration is captured merely by a time trend assuming that trade integration is a linear process. In contrast, Trefler (2004) and Beine & Coulombe (2007) measure trade integration by tariffs. Trefler (2004) provides evidence that a free trade agreement (FTA) between the US and Canada leads to trade creation, increased labor productivity, but reduced employment for manufacturing

[2]Bulgaria, Romania, Hungary, Estonia and Slovenia

[3]Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovak Republic and Slovenia

workers in Canada. Beine & Coulombe (2007) suggest that trade liberalization between Canadian regions and the US resulted in more regional export specialization for Canada in the short-run, but less regional export specialization in the long-run. The authors suggest that better access to suppliers and customers or positive spillovers may trigger other industries to locate in the initially specialized region and induce diversification of economic activities in the long-run. In contrast to Beine & Coulombe (2007) and Trefler (2004), this study tests the impact of trade integration on 13 transition countries[4] Based on trade theory, we expect a positive relation between trade integration and export specialization. But given the transition period of the countries in the sample, we also need to take other elements into account as possible determinants of export specialization such as institutional reforms. We will discuss the relevant literature of this determinant in the next subsection.

2.2 Institutional Reforms and Export Specialization

In addition to the literature on trade integration, there is a growing literature on the importance of institutions for various measures of economic performance. For example, Acemoglu et al. (2005b) show that Western countries with better access to the Atlantic ports have higher growth rates than Eastern European countries. They observe that countries with stronger political institutions, property rights and economic institutions traded more and spurred economic growth. In a more general framework, Acemoglu et al. (2005a) explain that good economic institutions create a stimulating environment for investors and producers. Increased investment leads to economic growth and larger trade flows. Therefore, institutions determine the economic outcome of a country. Also, Dollar & Kraay (2003) find empirically that trade and institutions have an impact on growth, but only in the long run.

With regard to trade, Jansen & Nordas (2004) provide empirical evidence that countries with better institutions trade more. Moreover, Francois & Manchin (2007)

[4]Poland, Hungary, Czech Republic, Slovenia, Slovakia, Malta, Cyprus, Estonia, Latvia, Lithuania, Bulgaria, Romania and Turkey

show that the infrastructure and institutional quality in a country matter more than decreasing tariffs in order to stimulate exports. This paper will study whether institutional reforms, in addition to tariffs, have an impact on export specialization in Central Europe. Therefore, we will use two measures of institutional reforms: enterprise reforms and competition policy reforms which will be explained in more detail in subsection 5.3.

3 Stylized Facts

In this section, we document the trends of the main variables from our regression analysis in section 4.

3.1 Trade Integration

The centrally planned economy in Central and Eastern Europe imposed fixed prices, quantity and quality and created a large shadow economy. Firms were stimulated to maximize output and employment instead of profits and efficiency. These incentives needed to be changed by transition reforms such as liberalization and privatization. The transition process started in 1989 and brought unexpected results. Together with price liberalization and privatization, output and employment decreased, inflation but also foreign direct investments increased (Roland 2000). In the pre-transition period, a centrally institution defined the bilateral trade relationships between countries. Transition caused almost a total collapse of this trade. Central and East European firms needed to reorient trade and improve products (Rodrik 1994), (Walsh & Whelan 2001). Figure 1 shows that in 1989 most countries exported already intensively to Western Europe, but also Russia was an important trade partner. In 2000 the export share to Europe increased sharply, while the share of export to Russia decreased in all countries.

Not only did Central Europe direct its exports more towards the European Union, but also the European Union allowed tariffs to decrease gradually during that period.

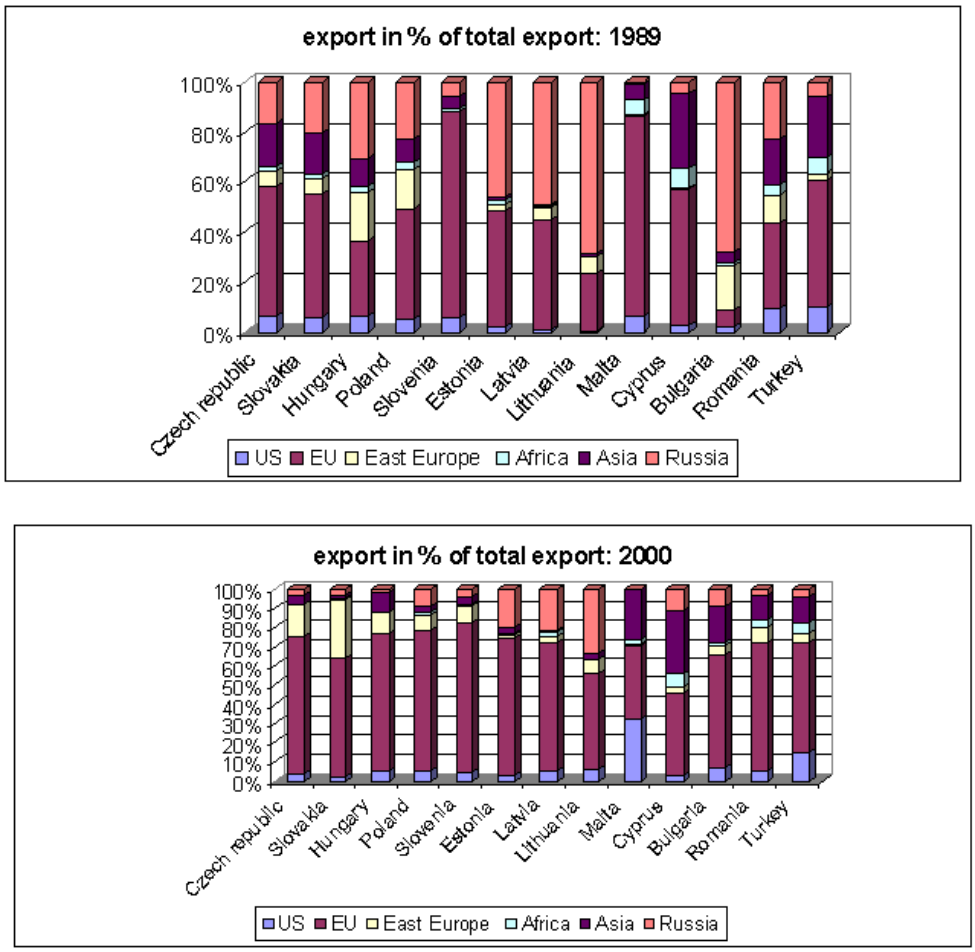

Figure 1: The shift of exports to Europe, 1989-2000

Source: UN (1993, 1997, 2002)

Figure 2 plots the average unweighed tariff of the EU15 on imports from Central Europe over time. The average tariff started at an already relatively low level of 4.1% and declined gradually over the period 1989-2000 with two major drops in 1994 and 1997.

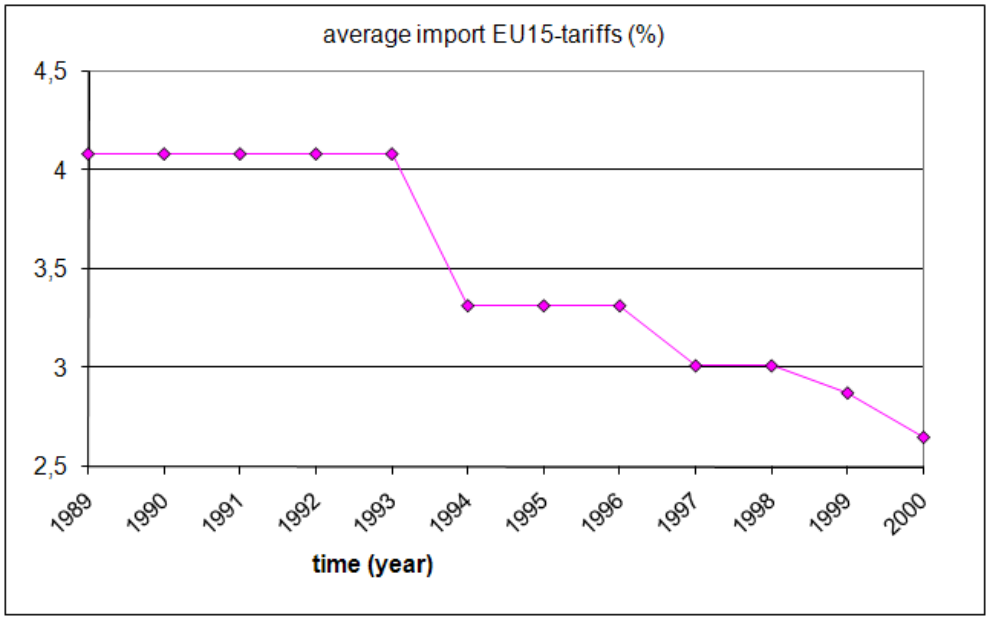

Figure 2: Trade liberalization of Central Europe with EU15 (%)

Source: Haveman data

By 1994 most countries[5] had signed a Europe agreement with the EU15 which was a bilateral agreement to decrease tariffs. These agreements might explain the first large decrease in tariffs in 1994 as illustrated in Figure 2. The second large tariff reduction was in 1997 and could be explained by the official start of the enlargement process in 1997-1998 when most Central European countries adopted the European legislation. One of the chapters of this legislation deals with free movement of goods and establishing a free trade area with the EU15. In May 2004, 10 countries

[5]Poland and Hungary were the first to sign the Europe agreement in 1991, the Czech Republic, Bulgaria, Romania and Slovakia followed in 1993, Estonia, Latvia and Lithuania signed their Europe agreement in 1995 and finally in 1996 Slovenia signed the Europe agreement. Turkey, Malta and Cyprus signed the association agreement already in 1963, 1970 and 1972 respectively

became a EU-member[6], followed by Bulgaria and Romania in January 2007. As a consequence, all remaining tariffs were abolished. Turkey applied for member ship, but is not a EU member yet.

3.2 Institutional Reform

During the nineties, Central Europe made considerable reforms in institutions and policies. We use data on two measures for institutional reforms, namely enterprise reforms and competition policy reforms, to verify to what extent institutional reforms in addition to trade integration matter for export specialization. These variables, collected from the EBRD reports, report to what extent these countries restructured their policies and institutions from plan-economy to market-economy based standards. The upper graph of Figure 3 suggests that during the period of our analysis, both types of institutional reforms have a clear positive trend. A second observation is that for the whole period, enterprise reforms were stronger than competition policy reforms and in addition the enterprise reforms series show more variation than the competition policy reforms series. During these eleven years, Central European countries improved from score 2 to almost score 3 on both institutional reforms. Since institutional reforms are only available for Central and Eastern European countries, a direct comparison with EU15 scores is not possible. In order to have some benchmark for these scores, we can compare the countries among each other according to their degree of development. The lower graph of Figure 3 illustrates that the more developed countries in our sample [7] also have higher scores on both institutional reforms indicators. Especially in the beginning of the period, the gap between countries with a high GDP per capita and countries with a low GDP per capita[8] is large. But from 1992 onwards, reforms in the less

[6]Cyprus, Malta, Slovakia, Slovenia, Poland, Czech Republic, Hungary, Estonia, Latvia and Lithuania

[7]Countries with a GDP per capita above average: Czech Republic, Hungary and Slovenia.

[8]Countries with a GDP per capita below average: Bulgaria, Estonia, Latvia, Lithuania, Poland, Romania, Slovakia.

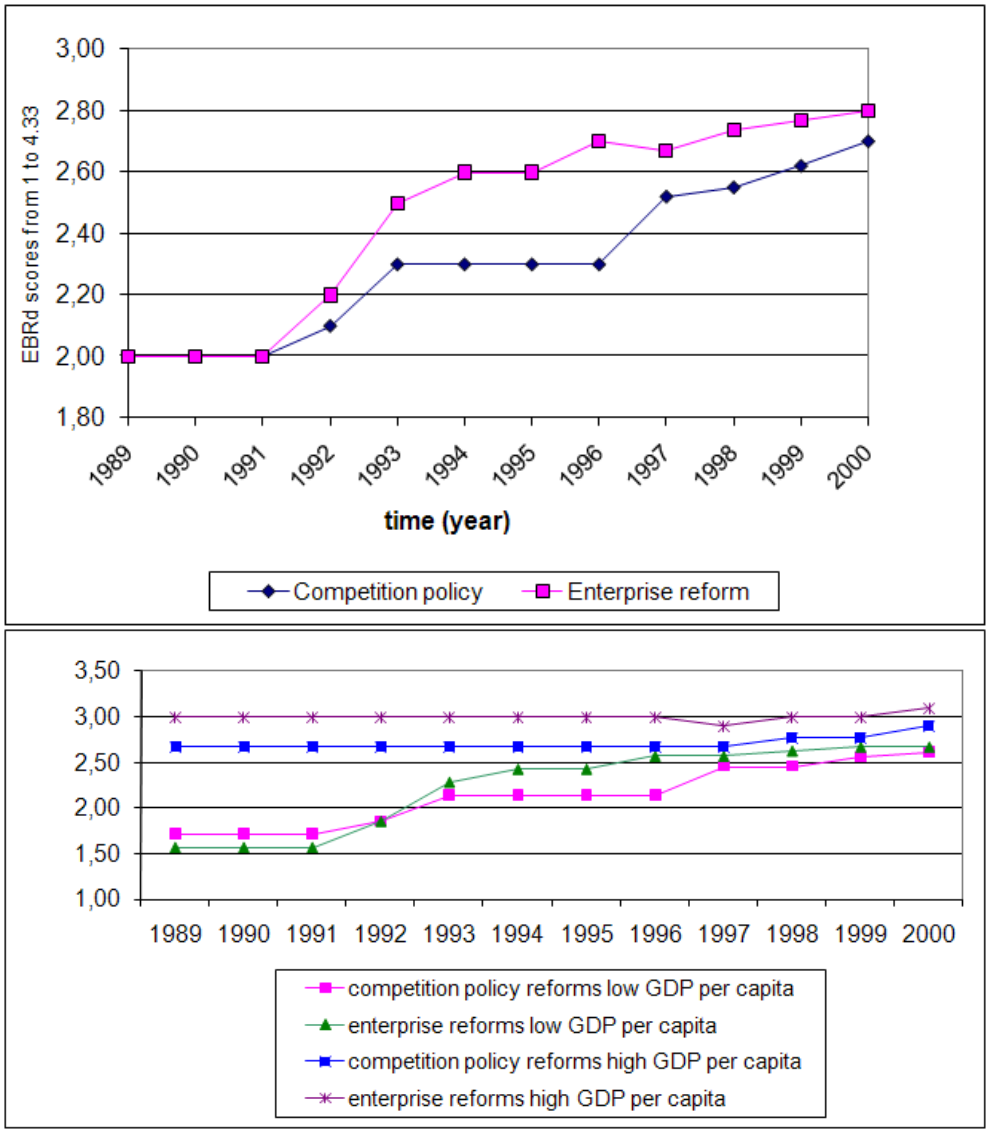

Figure 3: Average institutional reforms in Central Europe, 1989-2000

Source: EBRD reports, Note: Countries with a GDP per capita above average = Czech Republic, Hungary and Slovenia. Countries with a GDP per capita below average = Bulgaria, Estonia, Latvia, Lithuania, Poland, Romania, Slovakia.

developed countries catch up rapidly, while reforms in the more developed countries remain stable. The measures of institutional reforms will be explained in more detail in subsection 5.3.

3.3 Export Specialization

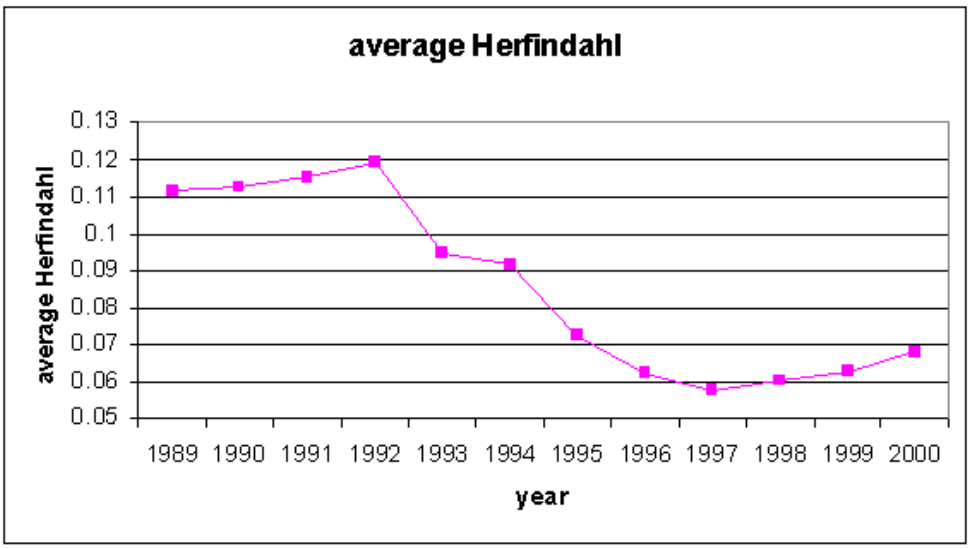

Figure 4: Average export specialization in Central Europe

Source: Eurostat

In Figure 4 we show the evolution of the average export specialization for 13 Central European countries during the period 1989-2000. We measure export specialization by an Herfindahl index on exports which will be explained in more detail in subsection 5.1. The index lies between 0 and 1 and the interpretation is as follows: a higher value of the index refers to more export specialization, whereas a Herfindahl index closer to zero suggests more export diversification. Figure 4 seems to indicate that export specialization in Central Europe is not a monotonic process. The figure illustrates that in the early nineties average export specialization increased sharply, probably because countries redirected their exports after transition. After 1992, export specialization decreased which could indicate that Central Europe started

exporting in more and new sectors. While after 1997, export specialization has increased again, suggesting that the number of sectors the countries are exporting in, went down. This U-shape is also what Imbs & Wacziarg (2003) and Koren & Tenreyro (2004) found for other countries: sectoral concentration is a function of the level of per capita income. Poor countries tend to diversify to reduce the risk of a sector specific shock, when they grow to higher levels of per capita income they specialize again, but never as high as their initial specialization level. Note that a similar value of the export specialization index at different moments in time may hide a different sector specialization. It might be that the export mix has changed over time. We will add a short discussion on this in section 8.

Note also that figure 4 illustrates the average export specialization for all 13 countries. Nevertheless, there are differences across countries. The individual evolution of the countries' export specialization is illustrated in Appendix 10.1. From these figures we observe that export specialization increased in the most recent years, except for Slovenia, Lithuania, Malta and Romania since they already had a high initial level of export specialization.

4 Methodology

In order to investigate the relationship between trade integration, institutions and export specialization, we build on the approach proposed by Beine & Coulombe (2007) which relies on the estimation of a dynamic panel model derived from an error correction model (See appendix 10.3, Vogelvang (2005)). The estimation model is as follows

$$\Delta log(Exp\ spec._{i,t}) = \alpha_i + \delta_t + \phi_1 log(Exp\ spec._{i,t-1}) + \phi_2 \Delta log(tariff_{EU15i,t}) \quad (1)$$

$$+\phi_3 log(tariff_{EU15i,t-1}) + \phi_4 I_{i,t} + \phi_5' Z_{i,t} + \epsilon_{i,t} \quad (2)$$

where i is a Central or Eastern European country in a certain year t. $Exp\ spec._{i,t}$ is

the level of export specialization measured by a Herfindahl index based on annual sectoral trade flows from country i to the EU15. $Tariff_{EU15i,t}$ is the EU15-tariff on imports from a Central and Eastern European country i. This measure is based on sectoral tariffs, weighted with the export structure of country i and aggregated to the country level. $I_{i,t}$ captures the level of a country's institutional reforms and $Z_{i,t}$ is a vector of other control variables such as the business cycle of country i. Country fixed effects, α_i, control for unobserved country-specific effects, time dummies, δ_t, take into account a common shock and $\epsilon_{i,t}$ is the error term. The definition of the variables will be clarified in more detail in section 5. This model is estimated with OLS[9] and Newey-West robust standard errors to take into account serial correlation and heteroscedasticity.

The dynamic nature of the model is important because it disentangles the short-run from the long-run effects of trade integration. The short-run is captured by ϕ_3 while the long run is given by $-\frac{\phi_2}{\phi_1}$. The decomposition of the effect of trade integration between a short- and a long-run component is important since a shock in tariffs will lead to short-run adjustment costs (displaced workers, closed plants), while in the long-run, trade liberalization will lead to efficiency gains (stakeholders of competitive plants and users of final and intermediate goods) (Trefler, 2004). The derivation of the short- and long-run effect of this model is explained in Appendix 10.3.

5 Data

We analyze export specialization (Exp spec.) in Central Europe as a function of trade weighted tariffs (tariff), institutional reforms (I) and other control variables (Z) such as the business cycles. This section gives an overview of the data and variables.

[9]GMM will be used as a robustness check. However, since the time series are short, the number of instruments are limited to two lags.

5.1 Export Specialization

A common measure for export specialization in the literature is the Herfindahl index on exports (Sapir 1996)[10]. The evolution of the Herfindahl index of export specialization might reveal to what extent a given country is becoming more specialized or diversified, regardless of how the economic structures of other countries are evolving. A recent study has shown that export specialization is a good proxy for industrial specialization (Laurin 2007).

The Herfindahl index is computed for each country i and each year t as the sum of squared export shares over all industries within one country.

$$Exp.\ spec._{i,t} = \sum_{k=1}^{J} (s_{i,t}^{k})^2 \tag{3}$$

$$where\ s_{i,t}^{k} = exports_{i,t}^{k} / \sum_{k=1}^{J} exports_{i,t}^{k}$$

A higher index indicates that country i exports in a smaller range of sectors and hence is more specialized. To construct the Herfindahl indices, yearly export flows from 13 individual countries of Central and Eastern Europe to the EU15 on the 8-digit HS classification[11] product level were collected from *Eurostat*[12]for the period 1989-2000[13]. Using a correspondence key, the data was translated to the 4-digit NACE industry level[14] (250 sectors) to calculate the industry export shares.

[10]We investigate here the degree of the so-called absolute specialization, i.e. the extent to what a given country or region is specialized in a limited number of activities. This concept of specialization directly relates to the concept of risk exposure. This contrasts with relative specialization which measures to what extent the export or production structure differs from those of the other (contingent) countries or regions.

[11]The Harmonized system (HS) is a classification system we use at the 8-digit product level and note that we collected trade data for all sectors, not only the manufacturing sector

[12]The Eurostat trade statistics is a high quality database containing annual data on trade flows to and from European countries.

[13]For Estonia, Latvia, Lithuania and Slovenia data was only available from 1992 onwards and for Slovakia from 1993 onwards.

[14]NACE is a European classification system.

5.2 Trade Integration

Most previous studies on trade integration use time dummies to capture trade integration and thereby implicitly assume that trade integration is linear over time. From Figure 4 we know that trade integration is not linear, therefore we rather use tariffs to measure trade integration as in Beine & Coulombe (2007) and Trefler (2004). Yearly EU15-tariffs[15] on the HS 8-digit product level are collected from the *Haveman database*. These data are available from 1989 until 2000. Since not all tariffs were available for all years[16], we replaced the missing tariff at time t with the tariff value at $t+1$[17].

The sectoral EU15-tariffs τ^k on exports from Central and Eastern European countries are aggregated to the country level using the industry export shares of the country as weights w_i^k:

$$tariff_{EU15i,t} = \sum_{k=1}^{J} w_{i,t}^k \tau_t^k \tag{4}$$

$$with\ weight\ w_{i,t}^k = exports_i^k / \sum_{k=1}^{J} exports_i^k$$

Note that we study only trade flows to and tariffs from the EU15. Since the EU15 is the main trading partner of the Central and East European countries as illustrated in Figure 1, EU15-tariffs will have the largest effect on export specialization in Central Europe and tariffs of the rest of the world will not play a major role in our results.

To test the robustness of this trade weighted tariff, regressions with different weights and two alternative measures for tariffs will be used in the estimations in section 6.

[15] Only the preferential rates on export products from an individual Central and Eastern European country was used, but when this rate was not available, we used the MFN (most favored nations) rates.

[16] Only the years 1996, 1998, 1999 and 2000 were available for most products.

[17] To test the impact of this manipulation, we ran estimations where we replaced the missing tariff at time t with the tariff value of time $t-1$. The results did not change

5.3 Institutional reforms

The transition process also implied a drastic institutional change in Central Europe. Institutions were reformed towards more market economy standards. We will use two indicators of institutional reforms: enterprise reforms and competition policy reforms from the *EBRD*[18]. These transition indicators reflect the judgment of the EBRD about country-specific progress in enterprise and competition policy reforms. EBRD country specialists propose a score for a particular country which is then discussed at length by an internal committee within the EBRD. Each country gets a score between 1 and 4.33[19] where 1 represents an institution with little or no change from a centrally planned market and 4.33 indicates that the standards of an industrialized market economy are implemented in the institutional environment of the country. To assign these scores, the EBRD follows certain criteria for each institution based on the following classification system in Table 1.

The indicator of enterprise reforms reports to what extent the countries reduced production subsidies and introduced effective bankruptcy procedures to be more in line with market-economy standards. A country has a score of 1 if there is no financial discipline at the enterprise level, this means that inefficient firms receive generous state subsidies to continue production. When effective bankruptcy procedures exist and credits are given to the most efficient firms, the country will receive a score of 4.33. The competition policy reforms indicator concentrates on facilitating market entry and combating the abuse of market dominance by monopolies. A score of 1 indicates that there is no competition legislation, a few dominant firms control the market and market entry is restricted. When a country achieves effective enforcement of competition policy, meaning unrestricted entry to the market and punishment of abuse of market power, a score of 4.33 is given. A disadvantage of these indicators is that for some countries the variable does not vary much over

[18]EBRD is the European Bank for Reconstruction and Development

[19]The scores increment with 0.33, this means that the scale between, say 2 and 3, would have the following components: 2;2.33;2.66 and 3

Table 1: Institutional reforms

score	enterprise reforms
1	if there are soft budget constraints (lax credit and subsidy policies weakening financial discipline at the enterprise level) and few other reforms are made to promote corporate governance.
2	if there is a moderately tight credit and subsidy policy, but weak enforcement of bankruptcy legislation and little action taken to strengthen competition and corporate governance.
3	if significant and sustained actions are taken to harden budget constraints (tight credit and subsidy policy) and to promote corporate governance effectively.
4	if substantial improvement is made in corporate governance and significant new investment at the enterprise level.
4.33	if there are standards and performance typical of advanced industrial economies: effective corporate control exercised through domestic financial institutions and markets, fostering market-driven restructuring.
score	competition policy reforms
1	if there are no competition legislation and institutions.
2	if competition legislation and institutions are set up and there is some reduction of entry restrictions or enforcement action on dominant firms.
3	if some enforcement actions are taken to reduce abuse of market power and to promote a competitive environment.
4	if significant enforcement actions are taken to reduce abuse of market power and to promote a competitive environment.
4.33	if there are standards and performance norms typical of advanced industrial economies: effective enforcement of competition policy; unrestricted entry to most markets.

Source: EBRD reports

Note: the EBRD indicators are not available for Malta, Cyprus and Turkey.

time. A detailed table on this data is reported in Appendix 10.2.

A final remark should be made on corruption. According to Dixit (2004), deficiencies of the law are especially present in less developed countries and in transition countries. The collapse of a strict communist system and the transition to a market economy left some areas open for groups to provide alternative institutions and economic rules. Therefore, it is important to what extent these institutional variables take into account corruption. A corruption index is collected from 'transparency international network'. This index assesses the level at which corruption is perceived by businessman as impacting on commercial life. The index is based on several surveys in a list of countries and lies between 0 and 10. A score of 10 equals an entirely clean country, while 0 equals a country where business transactions are entirely dominated by extortion. In other words, a higher index equals less corruption perceived by businessmen in that country. Figure 5 illustrates that this corruption index is positively correlated with enterprise reforms. A country with more advanced enterprise reforms has also less corruption. This suggests that the level of corruption is possibly already taken into account in the institutional reforms measure.

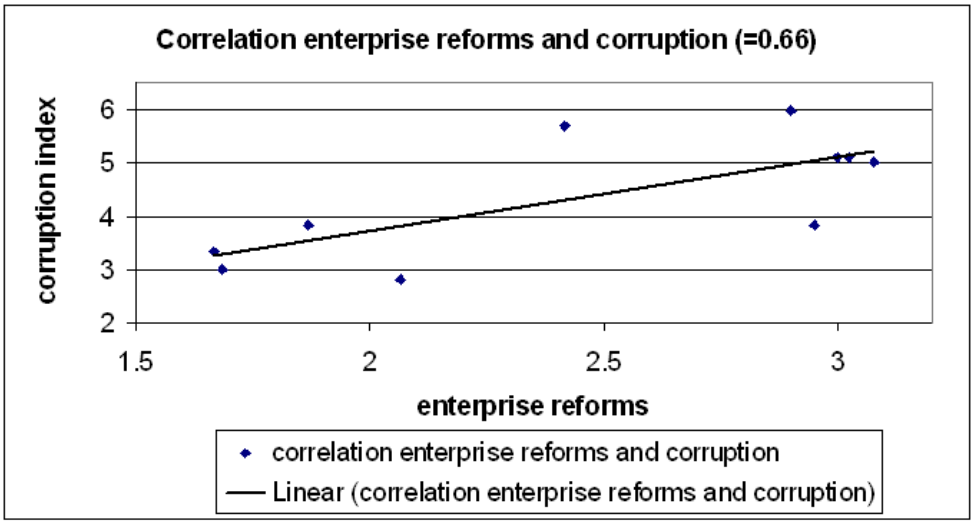

Figure 5: Correlation enterprise reforms and corruption in Central Europe

5.4 Other control Variables

This subsection describes four other control variables that might also affect export specialization in Central Europe. First, to control for business cycles in individual Central and East European countries and the EU15, GDP data (*EBRD reports, IMF database*) are decomposed in a growth trend and a cyclical component, the business cycle, with the Hodrick-Prescott filter.[20]

Second, the economic freedom index reports an index for hidden import barriers (HIB) other than published tariffs and quotas[21]. Since correlation between the hidden import barriers index and our variable for trade weighted tariffs is low (correlation = 0.0136), this variable can be included complementary to the tariff variable. This will allow us to control for other tariffs, non-tariff barriers or quotas that are not captured by the tariff variable.

Final, two alternatives for the tariff variable will be used to measure trade integration with the EU15. An indicator of trade liberalization from the EBRD data will indicate to what extent there are no import or export restrictions. The indicator of price liberalization from the EBRD data will show to what extent there are no price restrictions in the country.

6 Results

Table 2 reports the main estimation results of equation (1). Column (1) shows the results of a regression with tariffs, control variables for the business cycle, country and time fixed effects. Since the year dummies are not significant and do not

[20]Maravall & del Rio (2001) and Pedersen (2001) suggest that the smoothing parameter of the filter should be between 6 and 14 for annual data. Higher values produce smoother results. In this analysis, we will use a value of 7 for the smoothing parameter. Results with a smooth value of 14 are not reported here, but are similar.

[21]HIB is only available for the years 1990, 1995 and 2000 on a country-level

change the result, they will not be included anymore in the following regressions[22]. Regressions (2) and (3) report the institutional reforms variables, enterprise reforms and competition policy reforms, separately[23] and reduce the analysis to 10 countries since the institutional reforms variables are not available for Malta, Cyprus and Turkey. According to Acemoglu et al. (2005a) institutions influence a country's economic performance, but economic performance will change the political power of groups in a society and thus change institutions. Therefore, institutions can be endogenous. The regression in column (4) instruments the variable enterprise reforms variables with its lag to control for possible endogeneity.

We find very robust results in favor of a long-run relationship between trade integration and export specialization $(-\phi_2/\phi_1)$[24]. The long-run relationship is negative, based at column (2) in Table 2, a 1% decrease in EU15-tariffs increases export specialization in Central Europe by 1.3%[25]. This result supports trade theories suggesting that trade integration leads to a long-run concentration of activities across regions and across sectors. In the short-run, trade integration has no significant influence on export specialization (coefficient ϕ_3 is not significant). The lagged dependent variable, log(export specialization$_{t-1}$), is negative significant suggesting that there is persistence and that the annual export specialization is decreasing. This is also what we observed in Figure 4.

Regarding the institutional reforms, the estimation results of Table 2 indicate that enterprise reforms have a positive and significant effect on export specialization. This implies that an increase of one unit in enterprise reforms, leads to an increase of 28% in export specialization. In contrast, competition policy reforms have no

[22]This is important because it suggests that our results are not driven by time trends common to all countries.

[23]The correlation (0.72) between the enterprise reforms and competition policy reforms variables is too high to include these variables in 1 regression.

[24]Using a Wald test, the ratio $(-\phi_2/\phi_1)$ is significantly different from zero (p-value = 0.0006).

[25]Estimations with more lags of the tariff and export specialization variables did not change results and were not significant. Therefore, these estimations are not reported here.

Table 2: Impact on export specialization for Central Europe

	(1)	(2)	(3)	(4) IV
$Constant$	-1.4***	-0.74*	-1.02*	-0.7
	(0.47)	(0.44)	(0.55)	(0.45)
$log(Exp\ spec._{i,t-1})$	**-0.41*** **	**-0.44*** **	**-0.39*** **	**-0.41*** **
	(0.08)	(0.08)	(0.08)	(0.09)
$log(tariff_{i,t-1})$	**-0.49*** **	**-0.58** **	**-0.23**	**-0.28**
	(0.15)	(0.28)	(0.25)	(0.29)
$\Delta log(tariff_{i,t})$	-0.21*	-0.13	-0.14	-0.15
	(0.12)	(0.11)	(0.10)	(0.15)
nat. business cycle$_{it}$	1.47e-06	6.17e-07	-8.21e-07	9.26e-07
	(1.74e-06)	(1.38e-06)	(1.80e-06)	(2.24e-06)
EU business cycle$_{it}$	0.001***	-0.0001	-.0001	-0.0002
	(.0006)	(0.0005)	(.0005)	(0.001)
enterprise reforms$_{it}$	-	**0.28*** **	-	0.04
		(0.10)		(0.17)
competition policy$_{it}$	-	-	**0.15**	-
			(0.09)	
time dummies	**yes**	-	-	-
country fixed effects	yes	yes	yes	yes
obs	121	91	91	91
$p\ value(F-stat)$	0.00	0.00	0.00	0.004
R^2	0.40	0.4	0.35	0.22

Robust standard errors of estimates are in parentheses. All models include country fixed effects and time dummies are only included in column (1). Column (2), (3) and (4) only take into account 10 countries since data on institutional reforms was not available for Malta, Cyprus and Turkey. In column (4) enterprise reform is instrumented using its lagged value. note:***, ** and * denote significance level of estimates at respectively 1, 5 and 10 percent levels.

significant effect on export specialization. A possible explanation is that competition policy can influence the volume of trade or exports, but does not influence export specialization in itself. Moreover, stricter credit policies implies that the least efficient firms will exit the market and only firms in the most productive sectors will survive. So that export will be concentrated in sectors with a comparative advantage. The last column of Table 2 lags enterprise reforms with one period to overcome possible endogeneity. The coefficient of enterprise reforms is still positive, but not significant. This might indicate that there is only a simultaneous effect of institutions and no lagged effect.

Compared to prior research, our study confirms the result of increasing specialization in Central Europe of previous studies using time dummies to measure trade integration (Hildebrandt & Wörz (2004) and Traistaru et al. (2003)). Moreover, we extend their result to 13 countries in Central Europe and identify the main drivers behind export specialization: trade integration and enterprise reforms. A possible explanation why we find the opposite result of Beine & Coulombe (2007) for Canada is the difference in the level of development of the sample countries (Imbs & Wacziarg (2003), Koren & Tenreyro (2004)).

7 Robustness checks

In order to assess the robustness of our regression results in Table 2, this section will report some extended analyses.

The regressions in columns (1) and (2) in Table 3 deal with possible econometric problems. First, since the weights of the tariff variable could be endogenously correlated with the Herfindahl index of exports, regression (1) uses constant weights (average export share over the period 1989-2000) in the tariff variable. The disadvantage of this constant weight is the loss of variation over time. Therefore, column (2) uses the weight of the tariff variable lagged by 1 period. We also need to consider the possibility of non-linearities in export specialization. From Figure 4 we know

that export specialization does not follow a monotonic pattern. Therefore, column (3) controls for a non-linear relationship between tariffs and export specialization. Since corruption was especially a big problem during transition in Central Europe, column (4) explicitly controls for corruption. Finally, regression (5) includes a measure for non published import tariffs and quotas (HIB).

The long-run effect of tariffs on export specialization still holds in columns (1) to (3). Moreover, in column (3) a non-linear effect of tariffs is positive, but not significant. A positive non-linear effect would imply that a small decrease in tariffs at higher tariff levels, decreases export specialization. This could be the case for prohibitive tariffs. A decrease in a prohibitive tariff will lead to more firms exporting in different sectors and thus induce export diversification. In our sample, the maximum unweighted import tariff is only 5.96% and not prohibitive.

Another robustness check explicitly controls for corruption. The estimation in column (4) shows that the corruption index is not significant. Finally, controlling for other tariffs (HIB) is not significant and does not change previous results, the estimation in column (5) implies that the tariff variable captures most of the trade integration process between Central and Eastern Europe and the EU15[26].

Table 4 reports a second set of robustness checks. First, the sample is reduced to the period 1994-2000 in column (1). This robustness check excludes influences from a possible prohibitive tariff in the beginning of transition and the heavily restructuring period in the first years of transition. In Column (2), the sample excludes the countries Turkey, Bulgaria and Romania who have a different EU-accession path compared to the other countries. The results in Table 4 show that the long-run effect of tariffs on export specialization holds in both cases.

Finally, Table 4 verifies whether our results are robust to different measures of trade integration and export specialization. In column (3) and (4), the tariff variable is replaced by an index of trade liberalization and an index of price liberalization

[26]Other authors tried to proxy non-tariff barriers by a frequency index but failed to find a significant influence on trade (Amiti & Konings (2007) and Mayer & Zignago (2005)).

Table 3: Impact on export specialization for Central Europe

	(1)	(2)	(3)	(4)	(5)
$Constant$	-0.84*	-0.4	-1.09***	-0.53	-0.96
	(0.51)	(0.64)	(0.44)	(0.52)	(6.65)
$log(Exp\ spec._{i,t-1})$	**-0.35*** **	**-0.56*** **	**-0.43*** **	**-0.40*** **	**-0.45*** **
	(0.07)	(0.1)	(0.08)	(0.08)	(0.08)
$log(tariff_{i,t-1})$	**-0.41*** **	**-0.84*** **	**-0.58*** **	**-0.12**	**-0.54*** **
	(0.16)	(0.33)	(0.16)	(0.26)	(0.16)
$\Delta log(tariff_{i,t})$	0.13	-0.04	-0.42*	-0.11	-0.18
	(0.18)	(0.08)	(0.23)	(0.08)	(0.12)
nat. business cycle$_{it}$	-1.64e-07	4.12e-06	1.78e-06	9e-07	1.72e-06
	(1.31e-06)	(2.80e-06)	(1.66e-06)	(1.39e-06)	(1.90e-06)
EU business cycle$_{it}$	.0006	-0.0003	0.001**	-0.0003	0.001
	(.0005)	(0.0004)	(0.0005)	(0.0005)	(0.001)
$\Delta log(tariff^2_{i,t})$	-	-	0.23	-	
			(0.17)		
corruption$_{it}$	-	-	-	-0.09	
				(0.07)	
HIB$_{it}$	-	-	-	-	**-0.04**
					(0.87)
country fixed effects	yes	yes	yes	yes	yes
obs	121	81	121	90	114
$p\ value(F-stat)$	0.00	0.00	0.00	0.00	0.00
R^2	0.58	0.46	0.38	0.41	0.38

Robust standard errors of estimates are in parentheses. All models include country fixed effects. In column (1) the regression uses constant export shares as weights for the tariff variable and in column (2) the weights of the tariff variable are lagged by one period. Column (3) takes into account a non linear effect of tariffs on export specialization. A variable to control for corruption or for other barriers (HIB) is included in column (4) and (5) respectively. note:***, ** and * denote significance level of estimates at respectively 1, 5 and 10 percent levels.

respectively, both variables show up positive and significant in the regressions. This confirms that more trade or price liberalization leads to more export specialization in Central Europe.

8 Discussion of results

A recent study by Francois & Manchin (2007) examines the role of institutions, infrastructure and tariffs in explaining why some countries trade and others do not. The authors show that basic infrastructure (communications and transport) and institutional quality matter more for exports than tariffs. Our results showed that a decrease in EU15 tariffs by 1% induces an increase in export specialization by 1.3%, while an increase of one unit of enterprise reforms leads to an increase in export specialization by 28%. A wald test could not counter the null hypothesis that the coefficient of the long-run effect of tariffs and the coefficient of enterprise reforms are equal. This suggests that both tariffs and enterprise reforms play an important role in stimulating export specialization in Central and Eastern Europe although the tariff effect is more robust.

A second discussion we would like to mention here refers to Figure 4 in section 3. This figure illustrated the average export specialization in Central Europe. Since this does not show us in which sectors Central Europe is specialized in, we will study this in more detail here. First, we would like to analyze how much of the specialization in 2000 is associated with a change in the composition of total exports. Therefore we follow Hoekman & Djankov (1997) who measure the change in the composition of exports by calculating the simple correlation between RCAs[27] for each country in 1990 and 1995. A higher correlation indicates that less change has occurred.

[27]RCA is the revealed comparative advantage index and measures as:

$$(\frac{x_{ij}}{X_j})/(\frac{\sum_{i=1}^{N} x_{ij}}{\sum_{j=1}^{N} X_j}) \tag{5}$$

where x_{ij} are exports in sector i by country j, X_j are country j's total exports, N is the number of countries

Table 4: Robustness check

	(1)	(2)	(3)	(4)
$Constant$	-1.56**	-0.98**	-1.17***	-1.18***
	(0.67)	(0.5)	(0.42)	(0.37)
$log(Exp\ spec._{i,t-1})$	**-0.47*** **	**-0.45*** **	**-0.36*** **	**-0.38*** **
	(0.1)	(0.09)	(0.09)	(0.09)
$log(tariff_{i,t-1})$	**-0.55****	**-0.63*** **		-
	(0.26)	(0.17)		
$\Delta log(tariff_{i,t})$	-0.19*	-0.21*	-	-
	(0.11)	(0.13)		
nat. bus. $cycle_{it}$	-9.64e-07	5.25e-06***	5.36e-07	7.99e-07
	(2.19e-06)	(1.69e-06)	(1.29e-06)	(1.28e-06)
EU bus. $cycle_{it}$	0.002*	0.002***	-0.0004	-0.0005
	(0.0008)	(0.001)	(0.0004)	(0.0004)
trade $liberal._{it}$	-	-	**0.09***	-
			(0.05)	
price $liberal._{it}$	-	-	-	**0.12*** **
				(0.05)
country f. e.	yes	yes	yes	yes
obs	87	88	91	91
$p\ value(F-stat)$	0.00	0.00	0.00	0.00
R^2	0.41	0.41	0.58	0.37

Robust standard errors of estimates are in parentheses. Column (1) does not include the years 1989-1993, while column (2) uses only the EU10 (not Turkey, Bulgaria and Romania). Regressions in column (3) and (4) replace the tariff variable by an indicator of trade and price liberalization respectively. note: ***, ** and * denote significance level of estimates at respectively 1, 5 and 10 percent levels.

Hoekman & Djankov (1997) observe little change in the composition of exports. Most countries of Central Europe exported in the same sectors in 1995 as in 1990. We will extend their analysis with our export data from 1989 until 2000 for 13 countries. The correlations between the RCAs for each country in 1989 and 2000 are reported in Table 5. We observe that the correlations are remarkably lower than in Hoekman & Djankov (1997) which might be indicative of a change in the composition of exports of Central Europe in 2000. Second, to gain insight in which sectors the Central European countries are specialized, Figures 6 to 8 compare the export share in the manufacturing, agriculture and mining sector for each country in 1989 and 2000. The figures show that all countries except Latvia[28] increased their export share in the manufacturing sector at the expense of exports in the agriculture and mining sector. Within the manufacturing sector especially exports in the transport, metals, electrical and textiles sector increased sharply (See figures in Appendix 10.4 for an overview per country). According to Sinn (2006) more and more Western European firms have their products prefabricated abroad. By setting up their own manufacturing plants in Eastern Europe (offshoring), they make use of the low wages in this region. While labor intensive upstream activities are shifted abroad, the downstream stages of production remain in Western Europe and are even expanded. A first glance on one of the expanding sectors in Central Europe, the textiles sector, shows us that indeed Central Europe is mainly exporting in labor-intensive sectors as preparation of textile fibres, textile weaving and manufacturing of knitted pullovers.

[28]Latvia increased its export share sharply in the agricultural sector.

Table 5: Change in the composition of exports, 1989-2000

	Bulgaria	Cyprus	Czech Rep.	Estonia	Latvia
Hoekman & Djankov (1997)	0.41		0.58		
Our results	0.4	0.65	0.52	0.49	0.34
	Malta	Hungary	Poland	Romania	Slovakia
Hoekman & Djankov (1997)		0.89	0.80	0.32	0.68
Our results	0.55	0.43	0.55	0.33	0.11
	Lithuania	Slovenia	Turkey		
Hoekman & Djankov (1997)					
Our results	0.22	0.63	0.71		

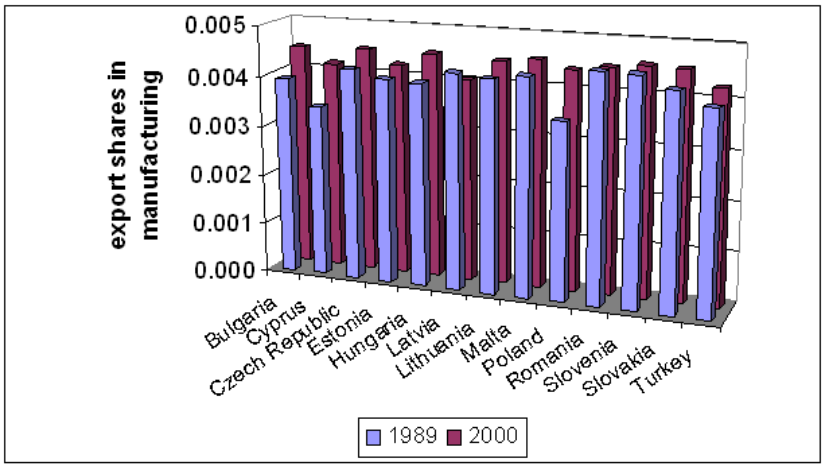

Figure 6: Average export share in manufacturing sector in Central Europe

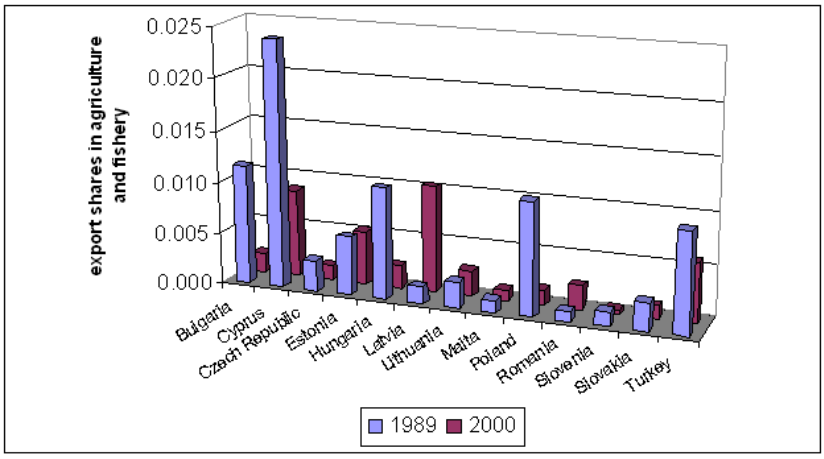

Figure 7: Average export share in agriculture sector in Central Europe

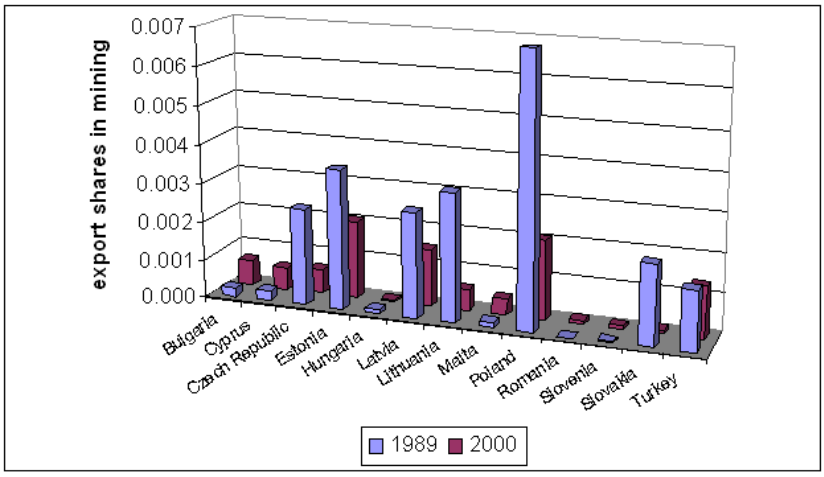

Figure 8: Average export share in mining sector in Central Europe

9 Conclusion

This paper analyzed whether the trade integration process between the EU15 and Central Europe has led to more export specialization in Central Europe. Moreover, we studied whether institutional reforms in Central Europe influenced export specialization. During the period 1989-2000, we observed a gradual decline in EU15 tariffs on exports from Central and Eastern European countries. In addition, institutional reforms in these countries increased rapidly as a result of the transition process from a centrally planned to a market economy. We focused on two types of institutional reforms: enterprise reforms and competition policy reforms. Both variables indicate to what extent Central Europe restructured its institutions to more market economy standards. Enterprise reforms include credit and subsidy policies for firms, while competition policy reforms consist of abolishing entry restrictions and dominant market power. On average, the 13 Central and East European countries in our sample performed better on enterprise reforms than on competition policy reforms. The impact of EU15 tariffs and institutional reforms on export specialization in Central Europe was analyzed using a dynamic panel model. This model enables us to disentangle between a short run and a long run effect of tariffs. The results indicate a positive effect of tariffs on export specialization in the long run. A 1% decrease in EU15-tariffs increases export specialization in Central Europe by 1.3%. Furthermore, an increase of enterprise reforms by one unit leads to an increase of about 28% in export specialization. Our findings are suggestive that both trade integration with the EU15 as enterprise reforms stimulate export specialization in Central and Eastern Europe.

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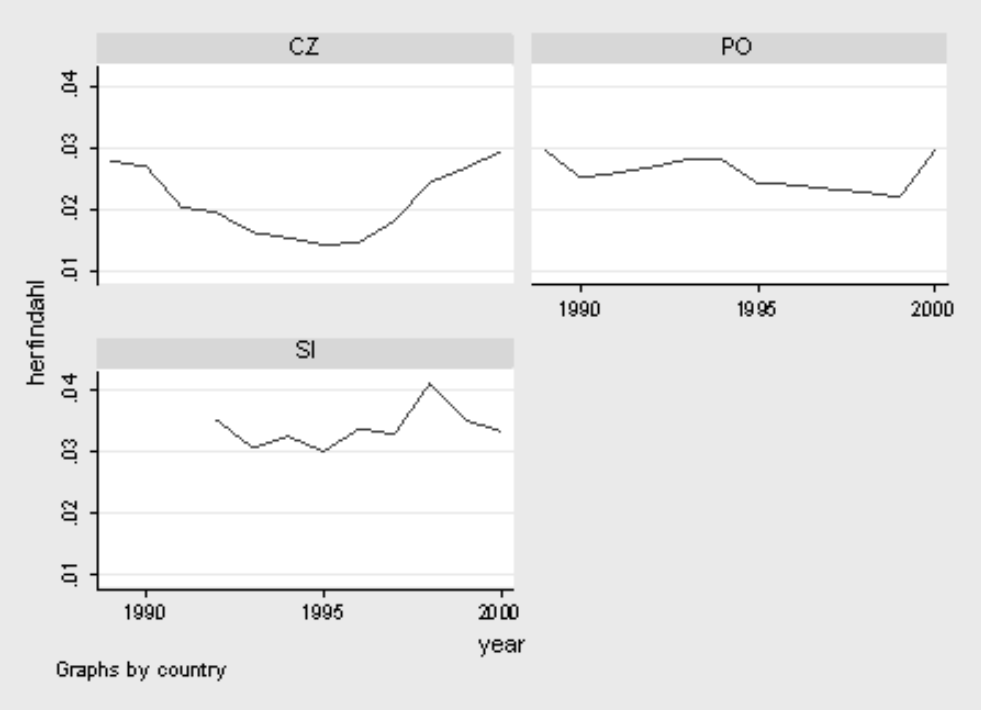
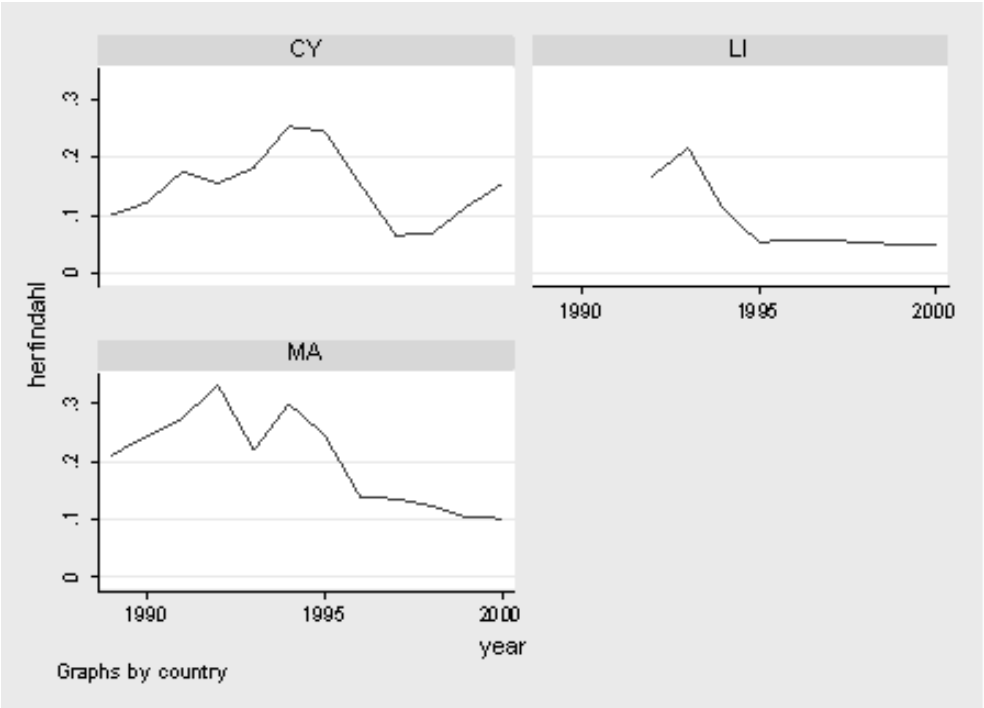
10 appendices

10.1 Average export specialization per country

The following graphs report the export specialization measured by the Herfindahl index per country over time, 1989-2000.

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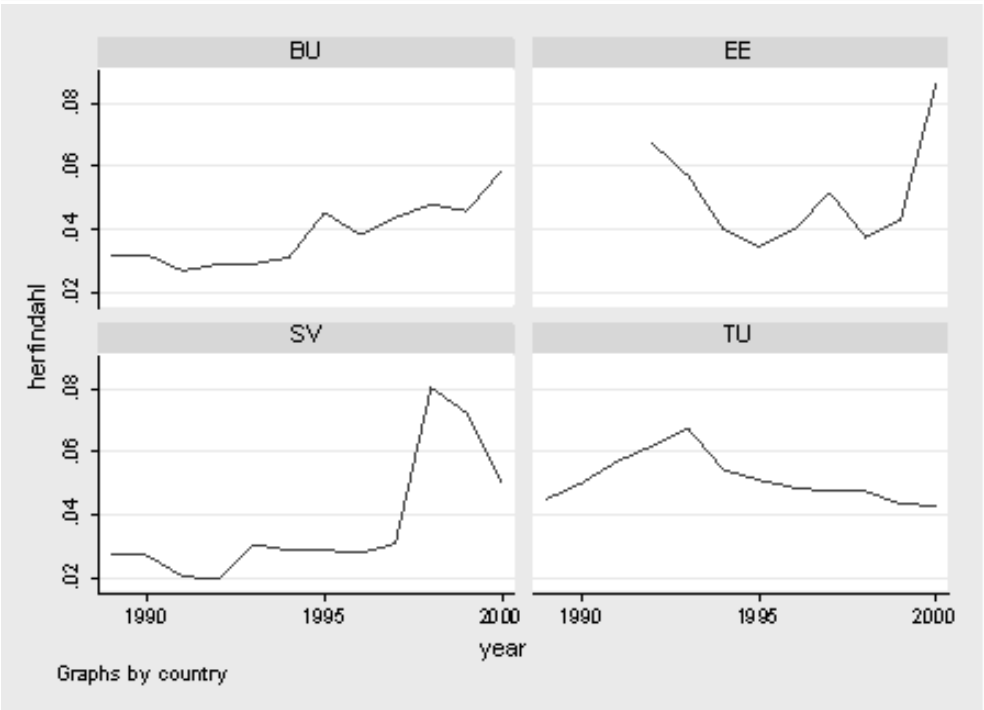
Graphs by country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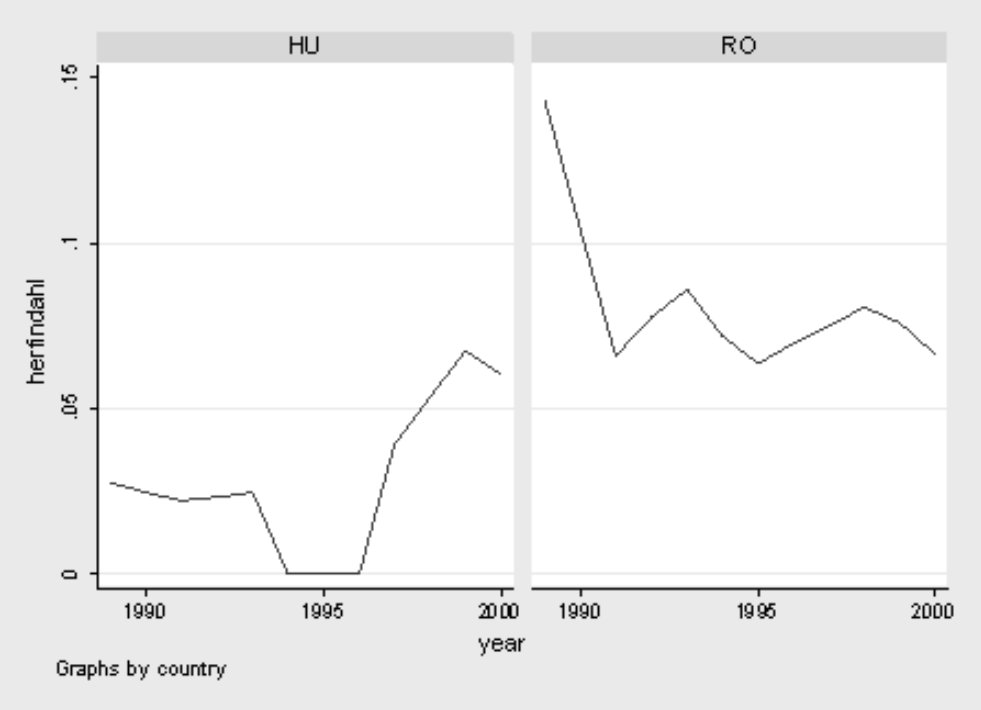
Graphs by country



10.2 Institutional reforms indicators

As an alternative to the tariff variable, two EBRD indicators on trade and price liberalization are used. These indicators lie between 1 and 4.33 according to their achievement in reforms. The classification system for the trade liberalization and price liberalization reforms are as follows:

Table A: Trade liberalization

score	Trade liberalization reforms
1	if there are widespread import and/or export controls or very limited legitimate access to foreign exchange.
2	if there is some liberalization of import and/or export controls; almost full current account convertibility in principle, but with a foreign exchange regime that is not fully transparent (possibly with multiple exchange rates).
3	if almost all quantitative and administrative import and export restrictions are removed and there is almost full current account convertibility.
4	if all quantitative and administrative import and export restrictions are removed (apart from agriculture) and all significant export tariffs; insignificant direct involvement in exports and imports by ministries and state-owned trading companies; no major non-uniformity of customs duties for non-agricultural goods and services; full and current account convertibility.
4.33	if there are standards and performance norms of advanced industrial economies: removal of most tariff barriers; membership in WTO.

Table B: Price liberalization

score	Price liberalization reforms
1	if most prices are formally controlled by the government.
2	if there is some lifting of price administration; state procurement at non-market prices for the majority of product categories.
3	if significant progress has been made on price liberalization, but state procurement at non-market prices remains substantial.
4	if there is comprehensive price liberalization; state procurement at non-market prices largely phased out; only a small number of administered prices remain.

Source: EBRD; Note: EBRD indicators are not available for Malta, Cyprus and Turkey.

Table C: Enterprise and competition policy reforms data

	Bulgaria		Czech Republic		Estonia	
year	competition	enterprise	competition	enterprise	competition	enterprise
1989	2	1	3	3	1	1
1990	2	1	3	3	1	1
1991	2	1	3	3	1	1
1992	2	1	3	3	1	2
1993	2	1	3	3	2	3
1994	2	2	3	3	2	3
1995	2	2	3	3	2	3
1996	2	2	3	3	2	3
1997	2.3	2.3	3	3	2	3
1998	2.3	2.3	3	3	2	3
1999	2.3	2.3	3	3	2.7	3
2000	2.3	2.3	3	3.3	2.7	3
	Hungary		Latvia		Lithuania	
year	competition	enterprise	competition	enterprise	competition	enterprise
1989	3	3	1	1	1	1
1990	3	3	1	1	1	1
1991	3	3	1	1	1	1
1992	3	3	2	2	1	1
1993	3	3	2	2	2	2
1994	3	3	2	2	2	2
1995	3	3	2	2	2	2
1996	3	3	2	3	2	2
1997	3	3	2.3	2.7	2.3	2.3
1998	3	3.3	2.3	2.7	2.3	2.7
1999	3	3.3	2.3	2.7	2.3	2.7
2000	3	3.3	2.3	2.7	2.7	2.7

	Poland		Romania		Slovenia	
year	competition	enterprise	competition	enterprise	competition	enterprise
1989	3	3	1	1	2	3
1990	3	3	1	1	2	3
1991	3	3	1	1	2	3
1992	3	3	1	1	2	3
1993	3	3	1	2	2	3
1994	3	3	1	2	2	3
1995	3	3	1	2	2	3
1996	3	3	1	2	2	3
1997	3	3	2.3	2	2	2.7
1998	3	3	2.3	2	2.3	2.7
1999	3	3	2.3	2	2.3	2.7
2000	3	3	2.3	2	2.7	2.7

	Slovakia	
year	competition	enterprisereform
1989	3	3
1990	3	3
1991	3	3
1992	3	3
1993	3	3
1994	3	3
1995	3	3
1996	3	3
1997	3	2.7
1998	3	2.7
1999	3	3
2000	3	3

Table D: Correlation matrix

	Δlog $(Exp\ spec)$	$log(Exp\ spec)_{t-1}$	$logtariff)_{t-1})$	Δlog $(tariff)$	bus. cycle	EU-bus. cycle	HIB	comp. policy ref.	enterp. ref.	price lib.	trade lib.
$\Delta log(Exp\ spec.)$	1	-0.31	-0.11	-0.24	-0.05	-0.07	-0.04	0.18	0.15	0.16	0.16
$log(Export$ $spec.)_{t-1}$	-0.31	1	0.48	0.23	0.03	-0.14	-0.18	-0.57	-0.48	-0.03	-0.28
$log(tariff)_{t-1}$	-0.11	0.48	1	-0.05	0.09	-0.04	0.01	-0.82	-0.68	-0.27	-0.29
$\Delta log(tariff)$	-0.24	0.23	-0.05	1	-0.07	0.07	0.07	-0.08	-0.12	-0.03	-0.13
business cycle	-0.05	0.03	0.09	-0.07	1	0.08	0.004	0.08	-0.1	-0.18	0.0001
EU-business cycle	-0.07	-0.14	-0.04	0.07	0.08	1	0.88	0.05	0.06	0.03	-0.02
HIB	-0.04	-0.18	0.01	0.07	0.005	0.88	1	-0.002	0.09	0.06	0.05
competition policy reform	0.18	-0.57	-0.82	-0.08	0.08	0.05	-0.002	1	0.72	0.4	0.54
enterprise reforms	0.15	-0.48	-0.68	-0.13	-0.1	0.06	0.09	0.72	1	0.47	0.57
price liberalization	0.22	-0.03	-0.27	-0.03	-0.18	0.03	0.06	0.4	0.47	1	0.46
trade liberalization	0.16	-0.28	-0.29	-0.13	0.0001	-0.02	0.05	0.54	0.57	0.46	1

10.3 Error correction model

Methodology:

Equation 1 is an error correction model without explicitly including an error correction term in the form of

$$\triangle y_t = \alpha + \varphi_1 y_{t-1} + \varphi_2 X_{t-1} + \varphi_3 \Delta X_t + \epsilon_t \tag{6}$$

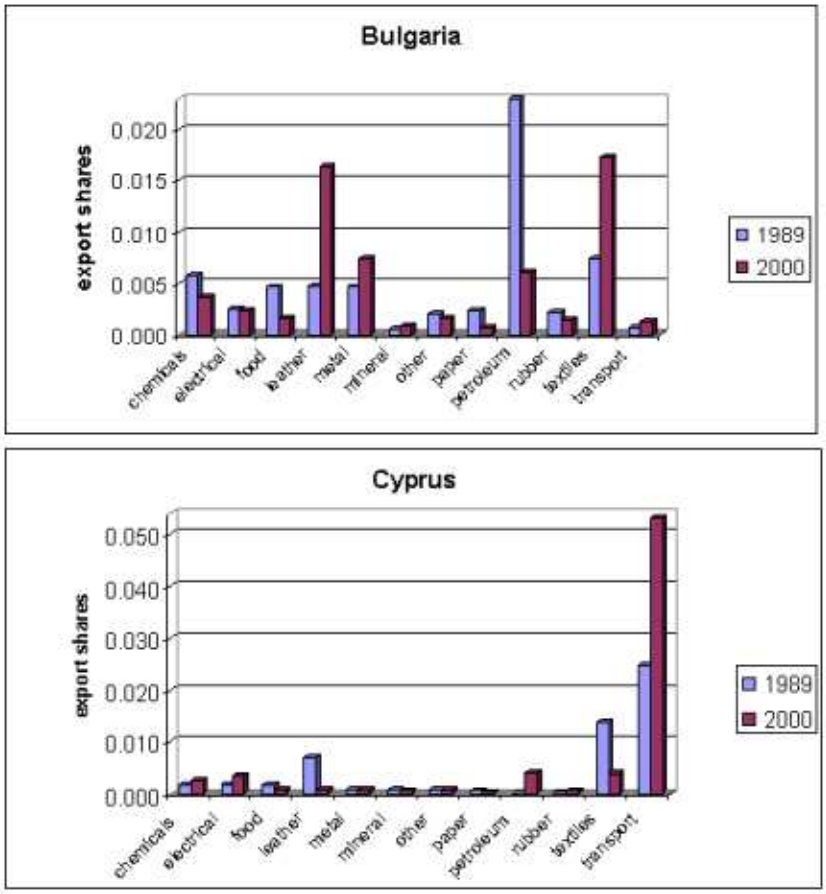
This model can be rewritten in an error correction form as follows:

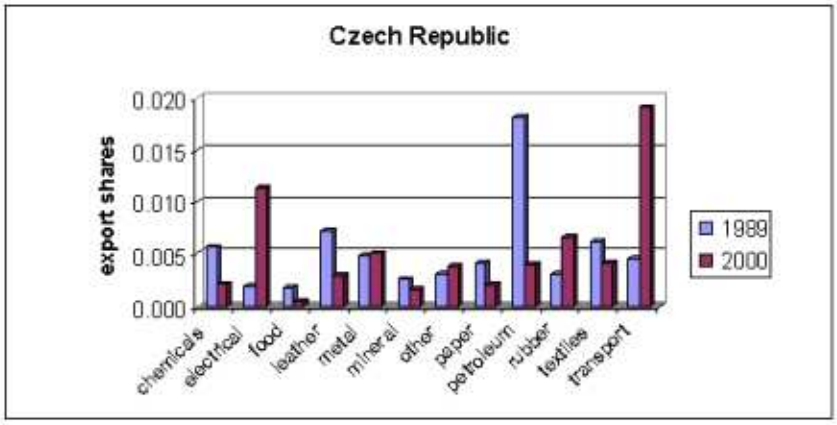
$$\triangle y_t = \alpha + \varphi_1 [y_{t-1} - (\frac{-\varphi_2}{\varphi_1}) X_{t-1}] + \varphi_3 \Delta X_t \tag{7}$$

φ_1 can be interpreted as the speed at which export specialization adjusts to any difference between export specialization and tariffs in the previous period. The short-run effect, the immediate effect that tariffs have on export specialization, is represented by φ_3. The causal effect that occurs over future periods, long-run effect is reflected by $-\frac{\varphi_2}{\varphi_1}$.

10.4 Export shares by industry per country

These graphs illustrate the export share by industry in 1989 and 2000 for each 13 countries separately.

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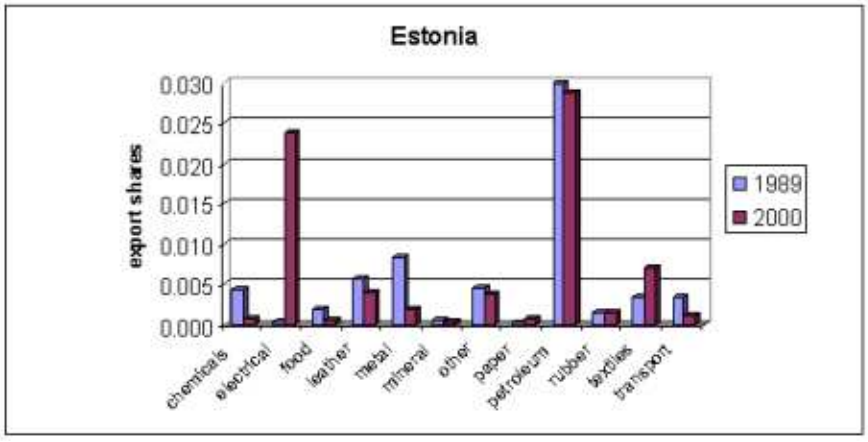
0.020
0.015
0.010
0.005
0.000
chemicals
electrical
food
leather
metal
mineral
other
paper
petroleum
rubber
textiles
transport
1989
2000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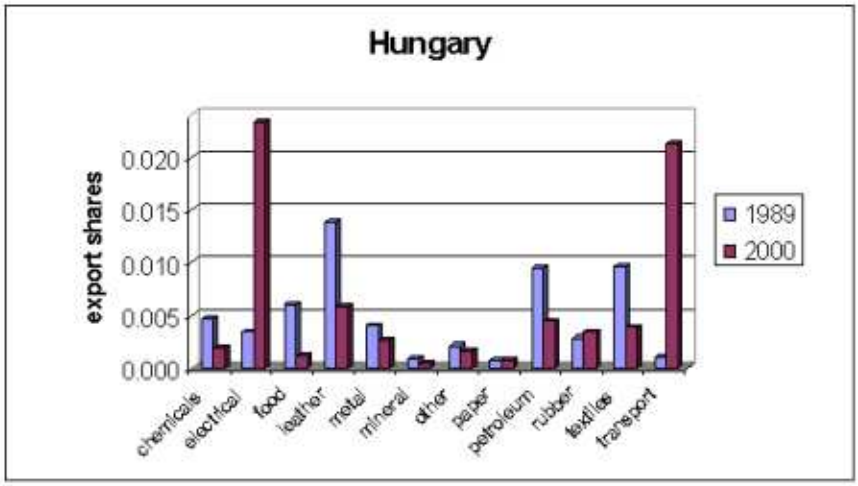
0.025
0.020
0.015
0.010
0.005
0.000
chemicals
electrical
food
leather
metal
mineral
other
paper
petroleum
rubber
textiles
transport
1989
2000


Hungary
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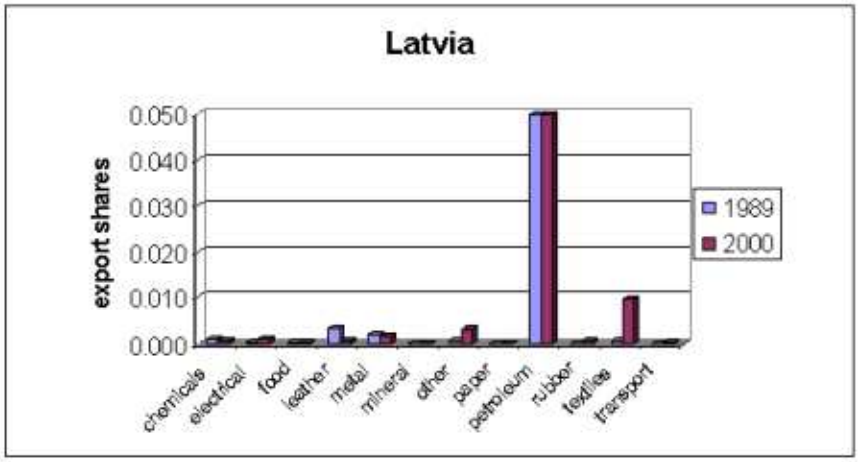
0.020
0.015
0.010
0.005
0.000
1989
2000
chemicals
electrical
food
leather
metal
mineral
other
paper
petroleum
rubber
textiles
transport


Latvia
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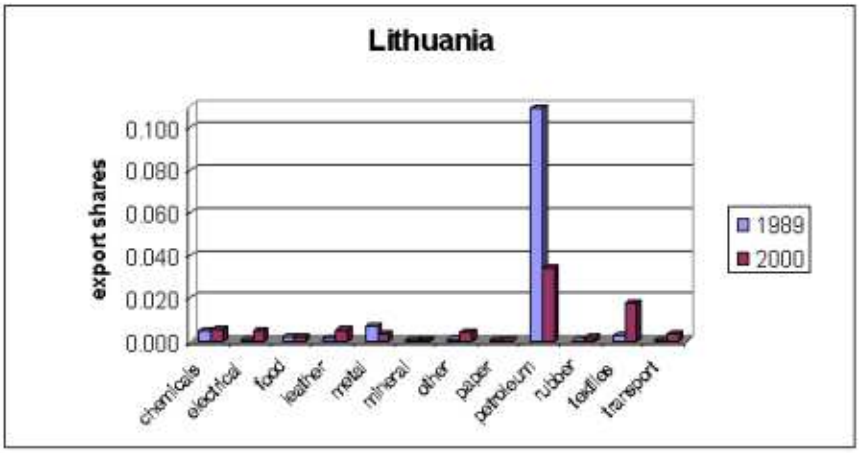
0.050
0.040
0.030
0.020
0.010
0.000
1989
2000
chemicals
electrical
food
leather
metal
mineral
other
paper
petroleum
rubber
textiles
transport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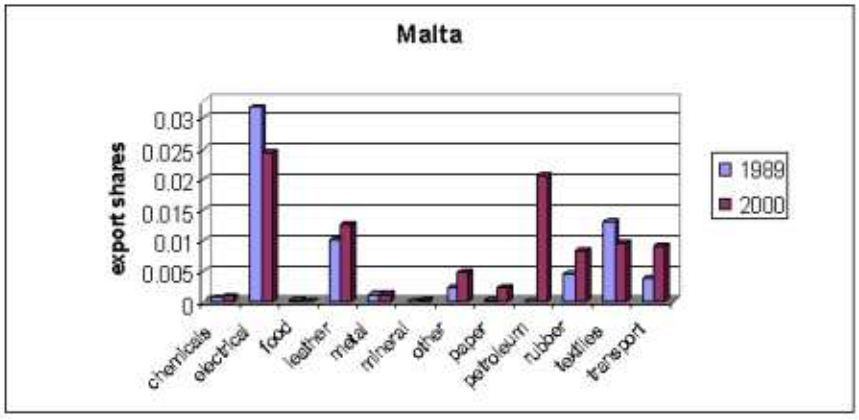
0.080
0.060
0.040
0.020
0.000
chemicals
electrical
food
leather
metal
mineral
other
paper
petroleum
rubber
textiles
transport
1989
2000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0.025
0.02
0.015
0.01
0.005
0
chemicals
electrical
food
leather
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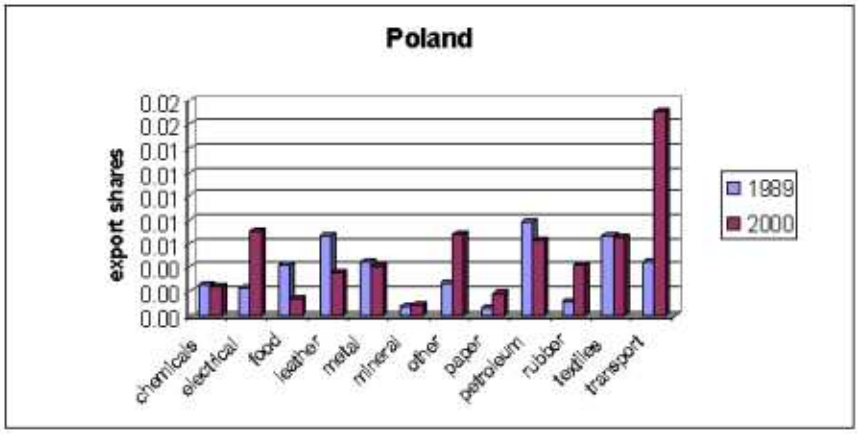
textiles
transport
1989
2000


Poland
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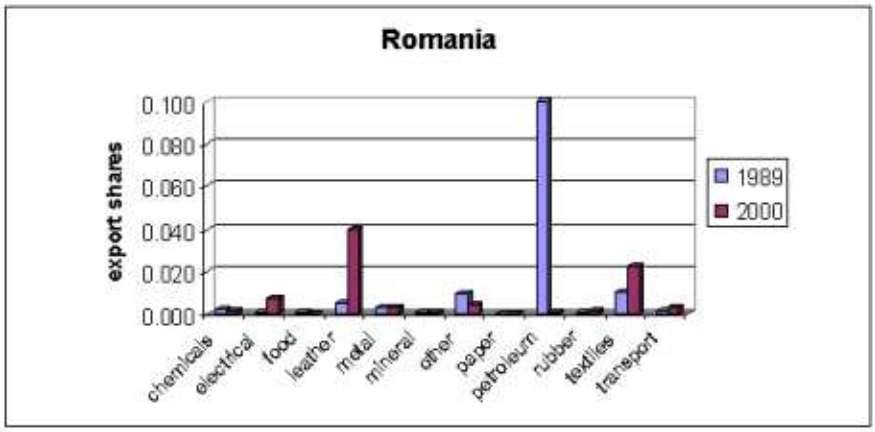
0.02
0.02
0.01
0.01
0.01
0.01
0.01
0.00
0.00
0.00
1989
2000
chemicals
electrical
food
leather
metal
mineral
other
paper
petroleum
rubber
textiles
transport


Romania
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0.080
0.060
0.040
0.020
0.000
1989
2000
chemicals
electrical
food
leather
metal
mineral
other
paper
petroleum
rubber
textiles
transport

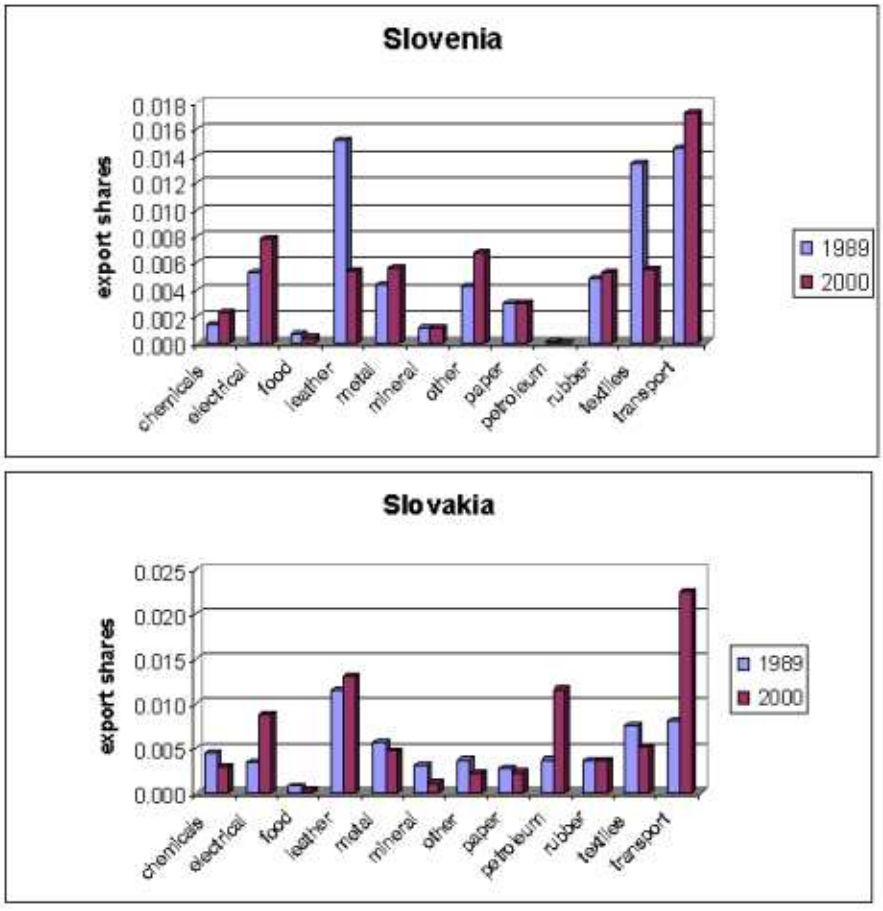

Figure A: Export shares per country within manufacturing