Disintegration and Trade

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Abstract:

The gravity model of trade is utilized to assess the impact of disintegration on trade. The analysis is based on three recent disintegration episodes involving the former Soviet Union, Yugoslavia and Czechoslovakia. The results point to a very strong home bias around the time of disintegration, with intra-union trade exceeding *normal* trade approximately 43 times in the former Soviet Union and Czechoslovakia, and 24 times in the former Yugoslavia. Disintegration was followed by a sharp fall in trade intensity. Nevertheless, there is a considerable hysteresis in economic relations, with trade flows among the former constituent Republics still between two and 30 times greater than *normal* trade in 1998.

NON-TECHNICAL SUMMARY:

Disintegration undoubtedly has an important effect on trade. Yet, the trade literature typically ponders the trade effects of integration rather than disintegration, although history tells us that countries break up more often than they unite. We use the gravity model to assess the impact of disintegration on trade among the former constituent Republics of three demised federations in Central and Eastern Europe: the Soviet Union, Yugoslavia and Czechoslovakia. For comparison, we then evaluate the effect of integration on trade—we look at German reunification, creation of preferential trade areas (PTA's) in Western and Eastern Europe, and liberalization of trade between Eastern and Western Europe.

We find that around the time of disintegration, trade flows between the constituent parts of Czechoslovakia, Soviet Union (represented here by Belarus, Russia and Ukraine) and the Baltic countries were approximately 43 times greater than *normal* trade (i.e. the trade corresponding to the GDPs of the respective countries and the distance between them). In contrast, the trade relations between Slovenia and Croatia were somewhat less intensive, exceeding the normal trade intensity approximately 24 times before the break-up. These results for the former federations in Eastern Europe thus indicate a very strong *home bias* in comparison with developed market economies. For example, McCallum (1995) finds that Canadian provinces trade 22 times more with other provinces than with US states of comparable economic size and distance. Helliwell (1997) estimates the home bias of OECD countries not sharing the same language to be on average 13.

Disintegration was followed by a sharp fall in trade intensity in all former federations. Nonetheless, the legacy of common past remains strong. In 1998, trade relations still exceeded the *normal* level two times for trade between Slovenia and Croatia, seven times for the former Czechoslovakia, 13 times for the Baltics, and 30 times for Belarus, Russia and Ukraine. Such trade intensities by far surpass the effects of formal preferential trade areas. For comparison, trade within the EU and the CEFTA (Central European Free Trade Area) exceeds normal trade approximately one-and-a-half times and two times, respectively. Rose (2000) studies the trade impact of currency unions and finds that two countries using the same currency trade three times more with each other than two

comparable countries using separate currencies. Apparently, common history is more important than formal liberalization of trade.

Compared to trade losses induced by disintegration, the gains following German reunification were less dramatic. By 1994, West German exports exceeded *normal* trade five times. Much of this export growth was apparently fueled by government transfers and public investments in the former German Democratic Republic. In contrast, West German imports from the former East Germany were only 77% above the normal level of trade. As such, the trade intensity between the two parts of Germany is closer to the lower bound of available estimates of *home bias* in developed countries.

In summary, our results suggest that although disintegration is associated with sharp deterioration of bilateral trade intensity, the relations between former constituent parts of the same federation retain some of their specific nature for several years after splitting up. The outside economic and political environment seems to matter as well. The Czech and Slovak Republics, which have better access to major Western European markets, experienced a deeper collapse of bilateral trade than the Baltics or Belarus-Russia-Ukraine, despite largely preserving the common economic area in the former Czechoslovakia. The prospects of an early EU membership for the Czech Republic, Slovenia and Estonia may have contributed to the further fall of trade with their traditional partners in the late 1990s. In contrast, trade intensity among Belarus, Russia and Ukraine actually increased in 1998, possibly as a consequence of the Russian crises, and efforts towards re-unification between Russia and Belarus. Hence, while disintegration matters, the overall context is important as well.

1 Introduction

Many papers and monographs have been written recently about economic aspects and consequences of integration. This surge of interest reflects the slow but steady intensification of integration processes in Western Europe and elsewhere. Yet, history tells us that countries break up much more often than they unite. The number of countries on the face of the Earth increased more than three-fold during the last century. The economic consequences of disintegration are undoubtedly substantial, even when the break-up is peaceful. However, very little research has been done to assess the costs of disintegration.

In this paper, we attempt to fill this gap, by looking at three recent disintegration episodes in Europe. We use the gravity model to assess the impact of disintegration on trade among the former constituent Republics of three demised federations in Central and Eastern Europe: the Soviet Union (we look separately on the Baltic countries on the one hand, and Belarus, Russia and Ukraine on the other hand), Yugoslavia and Czechoslovakia. For comparison, we then evaluate the effect of integration on trade—we look at German reunification, creation of preferential trade areas (PTA's) in Western and Eastern Europe, and liberalization of trade between Eastern and Western Europe.

The gravity model, in an analogy to the Theory of Gravity in Physics, relates the trade between a pair of countries to their *economic* mass, measured by their respective GDPs, and the distance between them. The non-standard nature of trade relations is identified by means of dummies for pairs or groups of countries of interest—a positive coefficient implies above-normal, or preferential, trade relations whereas a negative coefficient indicates below-normal, or discriminatory, trade relations. We estimate the gravity model with trade flows among the OECD countries and selected Central and Eastern European countries. By estimating the gravity equation separately for each year between 1990 and 1998, we are able to observe the evolution of trade patterns over time. We are particularly interested in the evolution of bilateral trade within former federations in the wake of disintegration.

We find that around the time of disintegration, trade flows between the constituent parts of Czechoslovakia, Soviet Union (represented here by Belarus, Russia and Ukraine) and the Baltic countries were approximately 43 times greater than *normal* trade (i.e. the trade

corresponding to the GDPs of the respective countries and the distance between them). In contrast, the trade relations between Slovenia and Croatia were somewhat less intensive, exceeding the normal trade intensity approximately 24 times at the time of the break-up. The result for the former Soviet Union, the Baltics and the former Czechoslovakia thus indicates a very strong *home bias* in comparison with developed market economies. For example, McCallum (1995) finds that Canadian provinces trade 22 times more with other provinces than with US states of comparable economic size and distance. Wolf (1997) estimates a similar tendency for 'excessive' trade within the federal states in the US. Helliwell (1997) estimates the home bias of OECD countries not sharing the same language to be on average 13. Similarly, Head and Mayer (2000) estimate that an average EU country purchases 14 times more from domestic producers than from equally distant foreign ones. Nitsch (1998) estimates the home bias for EU counties as 7 on average and ranging between 1.8 for the Netherlands and 68 for Portugal. Obstfeld and Rogoff (2000) provide a recent survey of estimates of the home bias in several countries.

Disintegration was followed by a sharp fall in trade intensity in all former federations. Nonetheless, the legacy of common past remains strong. In 1998, trade relations still exceeded the *normal* level two times for trade between Slovenia and Croatia, seven times for the former Czechoslovakia, 13 times for the Baltics, and 30 times for Belarus, Russia and Ukraine. Such trade intensities by far surpass the effects of formal preferential trade areas. For comparison, our findings indicate that trade within the EU and the CEFTA (Central European Free Trade Area) exceeds normal trade approximately one-and-a-half times and two times, respectively. Rose (2000) studies the trade impact of currency unions and finds that two countries using the same currency trade three times more with each other than two comparable countries using separate currencies. Apparently, the common history is more important than formal liberalization of trade, although in the case of the Baltics and Belarus-Russia-Ukraine, the continuing home bias can be partially attributed also to their relative geographical isolation.

To our knowledge, the effects of disintegration on trade received little attention in previous literature. This is probably due to lack of reliable data as well as lack of suitable disintegration episodes. The main exceptions are De Ménil and Maurel (1994) who use the

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gravity model to assess the trade effects of the disintegration of Austro-Hungarian Empire in 1918 Cheikbossian and Maurel (1998) who analyze the break-down of the CMEA and Djankov and Freund (2000) who estimate home bias for trade among selected Russian regions before the onset of economic reforms (1987–1990) and for a few years after the disintegration of the Soviet Union in 1992 (1994–1996).

Instead, most of the literature is concerned with the trade effect of integration, usually taking the form of free-trade areas and customs unions (see, for example, Bayoumi and Eichengreen, 1995, and Soloaga and Winters, 1999) or currency unions (Rose, 2000). Yet, it is difficult to distinguish the impact of a preferential-trade area from hysteresis in trade. As Eichengreen and Irwin (1996,) point out, formal integration usually follows above-standard trade relations in the past. By focusing on disintegration episodes in the time dimension, we are able to observe and evaluate the changes in trade patterns in the wake of disintegration. We find that although there is considerable hysteresis in trade relations after disintegration, the fall in trade intensity is substantial.

The next section describes the gravity model and discusses the main methodological issues. Section 3 describes the data. Sections 4, 5 and 6 present the results of our empirical analysis for former federations in Eastern Europe, German reunification, and formal preferential trade areas, respectively. The last section summarizes our conclusions.

2   The Gravity Model

The gravity model (Linnemann, 1966, and Linder, 1961) relates the trade flows between two countries to the importer's demand, the exporter's supply and the costs of engaging in trade. The importer's demand and the exporter's supply are proxied by aggregate outputs of the two countries (in addition, some studies use also the output per capita and/or the land area). Trade costs (transport and transaction costs) are proxied by geographical distance, typically measured as the distance between the capital cities of the two countries. Some studies use also measures of remoteness (see Smarzynska, 1999).

Although the gravity model of trade is commonly used to assess trade patterns between countries or within preferential trade areas, its theoretical underpinnings are ambiguous, and were only developed after the model had proven successful in empirical analysis. Helpman

and Krugman (1985) formulate the gravity relation in a model with differentiated products and increasing returns to scale. On the other hand, Deardorff (1995) derives the gravity model in the framework of the Heckscher-Ohlin model and concludes that the gravity model characterizes many models and, therefore, it cannot be used for testing trade theories. Evenett and Keller (1998) find empirical support for formulations of the gravity model based on both the Heckscher-Ohlin model and increasing returns to scale.

We estimate the gravity model in the following form:

$$M = \boldsymbol{b}_1 + \boldsymbol{b}_2 Y_M + \boldsymbol{b}_3 Y_X + \boldsymbol{b}_4 d + \sum_k \boldsymbol{b}_k D_k + \boldsymbol{e}, \qquad (1)$$

where M stands for bilateral imports,[1] Y is the GDP of the exporting and the importing countries (denoted by X and M, respectively), d is the distance between the capital cities of both countries,[2] and $\boldsymbol{e}$ is the disturbance term. All these variables are in logs. In line with the terminology common for the literature using the gravity model, we refer to the level of trade as predicted by the countries' economic sizes and distance as *normal* or *potential* trade. The intensity of non-standard trade relations is measured by means of dummy variables, D_k, for specific pairs or groups of countries. A positive coefficient estimate implies above-normal or preferential trade relations whereas a negative coefficient estimate, in contrast, implies below-normal or discriminatory trade pattern.

We include dummies to capture three types of trade relations. First, sharing a common border or common language reduces transaction costs. Therefore, we use a dummy for countries sharing a common border, and a dummy for English speaking countries. We do not include dummies for other languages as most of the other countries (out of those included in our data set) sharing a language also share borders.[3] Since the effect of language

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[1] For various reasons, the data on bilateral trade flows as reported by the two respective countries often differ. To ensure consistency, we use trade flows as reported by the importing country.

[2] We are grateful to Holzmann and Zukowska-Gagelmann (1996) for sharing with us their distance matrix. As in their paper, we use the center of a triangle defined by Frankfurt, Munich, and Berlin rather than the capital as the reference point for Germany.

[3] For example, Austria, Germany and Switzerland, Belgium and France, or Belgium and the Netherlands. The main exception is Canada and France having both French as their official language without having a common border.

on trade is not our primary interest, we allow for the common-language effect to be picked up by the border dummy in these cases.

Second, we use dummies for formal preferential trade areas in Europe. Specifically, we include dummies for the European Union (the 12 countries that formed the EU before the last enlargement, denoted henceforth as the EU12), the EFTA, the CEFTA (Czech Republic, Hungary, Poland, Slovakia and Slovenia), the last EU enlargement round (distinguishing trade flows between the EU12 and Austria, Finland, and Sweden, henceforth EFTA3), and the Europe Agreements between the EU and the associated countries.[4] To capture the evolution of trade relations, we use the same set of dummies for the entire period, i.e. also before the formal agreement was concluded. Finally, we include dummies for the successor states of former federations in Central and Eastern Europe. Because of problems with availability and reliability of the data, we are unable to include all former Republics of the Soviet Union and Yugoslavia. Therefore, we analyze trade patterns only among the Baltic countries, Belarus-Russia-Ukraine, and Slovenia-Croatia. We consider the Baltics separately from the rest of the former Soviet Union because of their specific historical and political background.

3   Data

Our data contain bilateral trade flows for OECD countries (excluding Iceland, Mexico and Korea), and selected Central and Eastern European countries. As we are interested in the evolution of trade relations during the processes of integration and disintegration that occurred during the last decade, we estimate equation (1) for each of the nine available years from 1990 to 1998. This data set provides between 600 and 1300 bilateral trade flows. The sample size changes because of data availability and especially because new countries emerged in Eastern Europe during the analyzed period. The data for Bulgaria, Hungary, Poland and Romania span the entire period. The trade data for Belarus, Croatia, Estonia, Latvia, Lithuania, Russia, Slovenia, and Ukraine start as of 1992, and those for the Czech Republic and Slovakia start as of 1993. In addition, we use estimates of pre-disintegration trade flows between the Czech and Slovak Republics (1991-93) and Slovenia

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

and Croatia (1990), as described below. The source of data on trade flows and aggregate outputs is the IMF (*Direction of Trade* for trade flows and *International Financial Statistics* for GDP). Missing data on aggregate output for some CEECs were taken from the EBRD Transition Report 1998.

Bilateral trade flows between constituent parts of former federations such as the Soviet Union, Yugoslavia, and Czechoslovakia were typically not officially reported, and therefore an assessment of the intensity of trade relations prior to the break-up is difficult.[5] An exception is the trade between the Czech and Slovak Republics, where alternative data are available for 1991-1993, the two years before the break-up and the first post break-up year. These data are based on enterprise reports of deliveries between the two Republics.[6] Two caveats apply to these data. First, they are based on enterprise reports, not customs statistics. Second, they include only deliveries of enterprises with 25 and more employees. Therefore, these data are not necessarily directly comparable with the official statistics. Nevertheless, the estimates obtained for 1993 based on the two types of data are almost identical and not statistically significantly different from each other. Therefore, we believe it is instructive to use these data to assess the trade intensity before break-up.

Similar data have been reported for Slovene trade with the other former federal Republics of Yugoslavia. According to Mencinger (1998), the rest of Yugoslavia accounted for 57.7 % and 58.7 % of Slovenia's total exports and imports in 1990, respectively. Croatia was the most important trade partner (28.8 % of both exports and imports) within the former federation. Stiblar (1996) reports a similar trade structure for Slovenia at the end of the 1980s. Based on this figures, along with estimates of Slovenia's total trade (without

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[5] According to Djankov and Freund (2000), inter-republic trade flows were not reported for the former Soviet Union between 1990 and 1993. Boss and Havlik (1994) report several estimates of trade flows among selected FSU countries at the beginning of the 1990s. However, these data are hardly comparable to later trade flows due to high inflation rate in the successor countries. Furthermore, the range of their estimates makes any comparisons questionable, although they generally confirm a significant decline of trade.

[6] The sources of the data are: *Vzajomne dodavky medzi SR a CR: 1.-4. stvrtrok 1992*, Statistical Office of the Slovak Republic, 1993; and *Predaj tovarov medzi SR a CR v roku 1993 podla stvrtrokov*, Statistical Office of the Slovak Republic, 1994.

the rest of former Yugoslavia) reported by WIIW (1999), we are able to estimate the trade flows between Slovenia and Croatia in 1990, one year before independence.

Finally, we compare the trade development in these countries to trade between West Germany and the former German Democratic Republic. Our data are based on German Statistical Office's reports of trade flows (including services) between both German regions from 1992 to 1994.[7]

4   Trade Effects of Disintegration

The number of observations[8] in our dataset nearly doubles between 1990 and 1998 as new countries arise from the ruins of the Soviet Union, Yugoslavia, and Czechoslovakia. The inclusion of additional observations might affect the results. Therefore, we estimate the gravity model as defined by (1) first on a sample of 630 original observations of bilateral trade flows, which are available throughout the entire period from 1990 to 1998. We will refer to this data subset as the restricted sample, and the results are reported in Table 1. Then, we estimate the gravity model on the full sample, containing also observations for the newly created countries. The results for the full sample are reported in Table 2. The last set of results makes use of alternative estimates of trade between the Czech and Slovak Republics, Slovenia and Croatia, and the two parts of Germany. For the sake of comparability, the results based on these alternative data sources are reported separately in Table 3. We estimate a separate equation for each year between 1990 and 1998 in order to be able to observe the evolution of trade relations over time.

Insert Tables 1-3 about here.

The gravity model gives very good explanation of trade patterns as evidenced by the high values of adjusted R^2, all exceeding 0.8. As expected, the effect of distance is negative

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[7] See *Vierteljahresergebnisse der Inlandsproduktsberechnung, 1991 bis 1994, Früheres Bundesgebiet*, Statistisches Bundesamt Wiesbaden, September 1997, p. 23.

[8] We succeeded to collect nearly all data on trade flows among countries of our sample. For example, we have only 23 missing or zero-trade observations for 1997. Therefore, the possible bias of truncated data is not important in this case. See for example Baldwin (1994) and Head and Mayer (2000) for discussion of gravity models estimated in truncated data samples.

and strongly significant. The coefficients estimated for GDPs of the importing and exporting country are not significantly different from each other. This is a general property of the gravity model—the home and foreign economies have the same effects on bilateral trade flows. Although there is some variation in the coefficient estimates over time, the values for individual years are never significantly different from each other at conventional levels. Countries sharing the same border, and English-speaking countries trade more intensely with each other. After transformation of logs to levels, trade between two neighboring countries exceeds the *normal* level (trade as predicted by GDP and distance between the two countries) of trade nearly 1.5 times, and trade between English-speaking countries exceeds the *normal* level nearly three times. The effects of common border and English language appear also very stable over time.

Our primary interest concerns the trade patterns among the former constituent Republics of the Soviet Union, Yugoslavia and Czechoslovakia. The intensity of trade relations among these countries is reflected in the coefficient estimates for the respective dummies (Table 2). In addition, Figure 1 depicts the evolution of these coefficients graphically, along with two-standard-error bounds.

Insert Figure 1 about here.

The results are strikingly similar for the former Soviet Union, the Baltics and the former Czechoslovakia, with trade flows exceeding the *normal* level approximately 41-43 times[9] during the first year for which we have data (1991 for Czechoslovakia, and 1992 for the Baltics and Belarus-Russia-Ukraine). These results indicate a much higher home bias that what is typically found in the literature (cf. McCallum, 1995, Helliwell, 1997, Wei 1996, and Nitsch, 1998).

Clearly, the intensity of trade within the former strongly centralized federations in Eastern Europe cannot be justified only by greater efficiency of intra-federation trade. In part, it reflected the relative closed nature of these formerly socialist economies and the fact that during the early 1990s, their trade with Western Europe was still not very liberalized

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[9] The coefficient estimates for the first year are between 3.71 and 3.77. The corresponding multiplicative factors are $\exp(3.71) = 40.9$ and $\exp(3.77) = 43.4$.

(East-West trade relations are discussed in greater detail below). In the case of the Baltics and Belarus-Russia-Ukraine, their relative remoteness from the major Western European markets probably plays a role too. In contrast to the former Soviet Union and Czechoslovakia, the trade between Slovenia and Croatia exceeded the normal level *only* 24 (exp(3.184)=24.1.) times in 1990.[10] This extent of home bias, while still high, is more similar to that observed for market economies.

The intensity of trade relations fell sharply after disintegration. To some extent, the reduction in trade intensity was natural because of the extremely high inward orientation and closed nature of these countries' economies as discussed above. Most likely, the home bias would have fallen even without the break-up. Indeed, in the case of the former Czechoslovakia, the trade intensity fell already during 1992, i.e. before the break-up, to 32 times the normal level. Nevertheless, the timing and the steepness of the decline suggest that disintegration was an important factor.

While the decline in trade intensity occurred immediately after the break-up in the cases of Slovenia-Croatia, the Baltics, and the former Czechoslovakia, the decline of trade intensity among Belarus, Russia and Ukraine started in the earnest only in 1995. This delay probably reflects the continued existence of a common economic area, and in particular the continued use of the Soviet (Russian) ruble in the CIS for an intermediate period after the break-up in 1991.

The case of the former Czechoslovakia is particularly interesting. The intensity of trade between the Czech and Slovak Republics fell sharply and uninterruptedly despite attempts by the successor countries to sustain a relatively high degree of integration. The Czech and Slovak Republics retained a customs union, a temporary clearing-account payment mechanism (until 1997), and free movement of labor (see Dedek, 1996). Yet, the intensity of trade relations dropped sharply, especially during 1993 and 1994, i.e. the first two years after the division of Czechoslovakia. Bilateral trade, which still exceeded the normal level 32 times in 1992, fell to 11 times the normal level in 1994. Then, the decline slowed down but

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[10] Note that we do not have trade between Slovenia and Croatia in 1991. This is indicated in Figure 1 on the x-axis, as well as by a dotted line before 1992.

continued, falling eventually to about seven times the *normal* level in 1998. Although the trade intensity as measured by the estimated coefficient on trade flows between the Czech Republic and Slovakia declined continuously, the actual volume of trade recovered slightly between 1993 and 1998.

Unlike in the former Czechoslovakia, the trade intensity among the Baltic countries and Slovenia-Croatia picked up temporarily after the initial sharp decline of trade in the wake of the break-up, before declining further eventually. For the Baltics, the trade intensity fell to 12 times the normal level in 1994, rising again to 23 in 1997 and finally falling to 13 times the *normal* level in 1998. The trade intensity between Slovenia and Croatia deteriorated to three times the *normal* level by 1994. After a slight recovery in 1995 and 1996 (with the home bias rising to four), it fell again to approximately two times the *normal* level in 1998.

The renewed deterioration of bilateral trade among the Baltics and between Slovenia and Croatia may be due to the inclusion of Estonia and Slovenia in the first wave of EU accession negotiations. This political decision increased the attractiveness of these two countries for trade and investment flows from the EU as well as third countries, thus diverting trade from the traditional trade partners. The negative opinion of the European Commission regarding non-standard trade relations of potential new members with the 'left-outs' may have played a role too. Similar factors may be behind the continued fall of bilateral trade between the Czech and Slovak Republics.

In contrast, the trade relations among Belarus, Russia and Ukraine followed a U-shaped pattern. The disintegration of the Soviet Union brought about a sharp deterioration of trade, reaching the bottom at eight times the *normal* level in 1997. However, 1998 brought a recovery to more than 30 times the *normal* level. Besides potential political reasons, such as the Russian-Belarussian attempts at re-integration, this may be a consequence of the Russian crisis. The crisis caused a breakdown of trade between the FSU and the developed countries. This was reflected in the rise of relative importance of trade within the FSU area. In addition, this increase in trade intensity may be driven by greater prevalence of re-exports from Belarus and Ukraine to Russia while reporting them as bilateral trade.

In summary, the empirical evidence suggests that disintegration processes in Eastern Europe brought about substantial declines in trade relations between the former constituent Republics. Nevertheless, the trade intensity continues to be relatively high, even when controlling for common border and membership in free trade areas such as CEFTA. This is in line with the findings of Fidrmuc (1999) who notes that Western European countries with common history and/or the same or similar languages also have more intensive bilateral trade relations. For example, he reports that Austrian trade with Germany is approximately twice higher than the *normal* level, trade between Sweden and Norway, and the UK and Ireland exceeds the *normal* level 2.5 times, and trade between Belgium and the Netherlands is triple the *normal* level. Accordingly, given the obvious cultural, social and linguistic links among the countries included in our analysis, it is reasonable to expect that, absent further exogenous shocks, their bilateral trade relations will continue to be substantially more intensive than relations with respect to third countries.

5 German Reunification

In this section, we consider an episode presenting the counterpart of disintegration—the reunification of Germany. Available trade statistics indicate that the reunification brought about a sharp increase of trade between former West Germany and the GDR, with the bulk of this increase occurring already before the political reunification.[11] According to West German data, West German exports to former East Germany nearly tripled between 1988 and 1990. However, export growth slowed down between 1992 and 1994. The growth of West German imports from former East Germany was not nearly as dramatic as the growth of exports. In 1994, the volume of West German exports exceeded imports from the East approximately five times.

Because data pertaining the pre-reunification period are not comparable with the later data,[12] we estimate the intensity of trade between the two German entities starting with 1991. Moreover, we were unable to obtain data on East-West trade after 1994. For these

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[11] After the fall of the Berlin Wall in November 1989, the two Germanies formed an economic and monetary union on July 1, 1990. The political unification formally materialized on October 3, 1990.

[12] The pre-unification data measure only goods exports whereas the later data also include services, see Haschke (1993).

reasons, our analysis of intra-German post-reunification trade pertains only to the period between 1991 and 1994. As the previous discussion suggests, the evolution of West German exports and imports differs considerably. Therefore, we estimate separate coefficients for both directions of trade flows. The distance between West and East Germany is estimated as the distance between Berlin and Frankfurt (530 km). Using different distance would change the coefficient estimates correspondingly, but not the dynamics of estimated trade intensities. GDP estimates for former East Germany are taken from Ragnitz et al. (2000). According to Ragnitz et al. (2000) and Von Hagen and Strauch (2000), transfers from West German States amounted to between 40 % and 50 % of East German GDP during the analyzed period. To account for the transfers, we reduced the estimates of East German GDP accordingly. So adjusted GDP better serves as a proxy for the supply of goods to explain West German imports from this region.

According to our estimates (Figure 2), West German exports were approximately six times greater than the *normal* level in 1991. The subsequent years brought a slight decline, to five times the *normal* level in 1994. This trade intensity corresponds to the lower bound of available estimates of *home bias* in developed countries. As such, it is in fact lower than the estimate of German home bias (ten) reported by Nitsch (1998). The slight decline in intensity of exports may reflect the gradual reduction of budgetary transfers and infrastructure investment in former East Germany during the analyzed period. On the other hand, the intensity of East German exports to West Germany increased between 1991 and 1994, albeit remaining at a much lower level: 71% above the normal level in 1991 and increasing to 77% by 1994. Hence, our results suggest that the German reunification brought about a substantial increase in the intensity of West German exports to former East Germany, whereas the intensity of flows in the opposite direction increased much more modestly. Apparently, much of the increase in exports was fueled by government transfers and infrastructure investments, rather than East German demand. As transfers and investments continue to fall in the future, so will the intensity of West German exports.

Insert Figure 2 about here.

6   Formal Preferential Trade Areas

The results presented in the previous section suggest that the former constituent Republics of demised federations continue to have strong trade relations, although their intensity is much less than before the break-up. In the present section, we discuss the trade effects of formal preferential trade areas—the EU, EFTA, CEFTA and the Europe Agreements—and compare them with trade patterns within the former federations.

Trade among the five Central European countries that eventually formed the CEFTA (Central European Free Trade Agreement) was initially on a downward trajectory following the dissolution of the CMEA in 1991—see Figure 3.[13] During 1992 and 1993, trade within CEFTA (encompassing initially the Czech Republic, Hungary, Poland and Slovakia and subsequently extended to include also Slovenia[14]) roughly corresponded to their incomes and distances (after controlling for the special trade relations between the Czech and Slovak Republic). Afterwards, trade relations gradually intensified, until reaching approximately twice the normal level of trade by 1997. According to the full sample, intra-CEFTA trade deteriorated again in 1998, to some 40 % above the normal level, it remains to be seen whether this is change in trend will be sustained.

Insert Figure 3 about here.

Trade between Western and Eastern European countries was affected by many trade restrictions during the cold war period, and, unsurprisingly, was far below the *normal* level at the beginning of the 1990s. According to the restricted sample, the trade of the 12 member states of the European Community with the group of countries, with which it later concluded the Europe Agreements[15], was about 40 % below the *normal* level. The trade of Austria, Finland and Sweden with these countries was one-third below the *normal* level. According to the full sample, the trade intensity was even lower. Trade liberalization following the collapse of communist regimes boosted trade among the former cold-war

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[13] Cheikbossian and Maurel (1998) show that the collapse of trade among the CMEA countries started already in the mid 1980s.

[14] Bulgaria and Romania recently joined the CEFTA too, however, in our analysis we only consider the trade flows among the four founding members and Slovenia

[15] Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia.

adversaries. The results based on the restricted sample indicate that trade between the EC12 and the associated countries reached the *normal* level by 1993. The EFTA3 countries (Austria, Finland and Sweden) liberalized their trade with the associated countries even faster. However, according to the full sample, which also includes the newly created countries, the trade relations of both the EC12 and EFTA3 with the associated countries did not reach the *normal* level until 1995.

Insert Figure 4 about here.

Formation of free trade areas in Western Europe had a positive although not very strong effect on trade flows—see Figure 5. In fact, the trade effect of Western European preferential-trade areas falls short even of that of the CEFTA. Trade between two EC12 countries exceeds trade between two comparable non-EU countries by one half on average. Despite deepening integration during the 1990s, in particular introduction of the Single Market in 1992, the effect of the EU on trade intensity remained stagnant. In fact, it appears that intra-union trade intensity actually declined slightly over time. The coefficient estimate fell from 0.417 in 1990 to 0.355 in 1998, although this decline is not statistically significant.[16] The accession of Austria, Finland and Sweden in 1995 had little if any effect on the trade intensity between the original EU members and the new members. The effect of the EFTA on trade intensity is even smaller. Although the coefficient estimate is positive, it is not significant at all except for 1992-93. At its peak in 1993, trade intensity within EFTA exceeded the *normal* level by less than 30 %. In contrast, the trade relations of Austria, Finland and Sweden (EFTA3) with the EU were much more intense than the trade relations within EFTA. By 1990, the EFTA3 countries traded by about one-fourth more with the EC countries than with the other countries in our sample. The main upward shift in the trade intensity occurred already in 1992 and preceded both the formation of the European Economic Area and the entry of these three countries to the European Union.

Insert Figure 5 about here.

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[16] This disappointing result is in line with the findings of Soloaga and Winter (1999), and others.

7 Sensitivity Analysis—Augmented Gravity Models

In this Section, we subject our results to robustness checks by replicating the analysis for alternative specifications of the gravity model augmented by additional explanatory variables. Besides assessing robustness, some of these variables, especially those related to exchange-rate variability, can provide additional insights on factors explaining the sharp decline of the 'home bias' in the wake of disintegration.

The first extension of the gravity equation is a measure of remoteness. Deardoff (1995) argues that not only the distance between two countries determines the bilateral trade volume, but also their geographic position relative to other countries. Given bilateral distance, two countries trade more if they are both more distant to other potential trade partners. Following this argument, Wei (1996) augments the gravity model by the following measures of the exporter's and importer's overall remoteness, R_X and R_M, respectively,

$$R_k = \sum_i w_i D_{ik} \, , \ k = X, M, \tag{2}$$

which is defined as a weighted average of distances to other countries, with the weight w_i is the share of country i in world output.[17] As the countries under focus in this paper are located on the periphery (at least relative to the countries included in our sample), the former members of disintegrated countries should on average trade more intensively than similar, but more centrally located, countries.

Another extension of the gravity model is to reveal exchange rate effects (including formation of a currency union) on trade flows. Rose (2000) estimates that countries with a common currency trade over three times as much with other as countries with different currencies. This result is reexamined and confirmed by Rose and Frankel (2000).

Unfortunately, we cannot separately estimate the effects of currency separation and political disintegration because the two events typically unfolded nearly parallel to each other. Nevertheless, the increased exchange rate volatility between the affected countries

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[17] We also tried an alternative measure of remoteness used by Wolf (1997) defined as ratio of the bilateral distance to an average of R_X and R_M, $R_{IJ} = D_{IJ} / 0.5 \ (R_X + R_M)$. However, this remoteness measure was less robust than those defined by (2).

should bring about a decline in bilateral trade. Following Frankel (2000), we therefore augment the gravity equation with a measure volatility (standard deviation) of monthly bilateral exchange rate (first differences of logs), s_{ij}, in respective years. Furthermore, we include also the importer's and exporter's average exchange rate volatility towards their trade partners as Wei (1996), $s_i = \sum_j^n s_{ij} / n$.

However, we should keep in mind that the effects of exchange rate volatility are generally less robust that those of currency unions. According to Frankel (2000), a reduction of exchange rate volatility is of magnitude less important than the effects of a currency union, but these effects are statistically significant. Wei (1996) even fails to find significant and theory consistent effects of exchange rate volatility on trade flows at all.

Thus, our augmented version of the gravity model, see (1), includes five additional variables: remoteness of exporter and importers, R_X and R_M, respectively, bilateral exchange rate volatility, s_{ij}, and the average exchange rate volatilities of both trade partners, s_X and s_M, respectively,

$$M = b_1 + b_2 Y_M + b_3 Y_X + b_4 d + b_5 s_{ij} + \sum_{j=X,M} b_j s_j + \sum_{i=X,M} b_i \log(R_i) + \sum_k b_k D_k + e. \quad (3)$$

The results of the augmented gravity model are reported in Table 4. The inclusion of additional variables does not change our results dramatically. Remoteness of exporter and importer has the correct (positive) sign. In general, our results do not show any stable effect of bilateral exchange rate variability on trade flows, although we do find negative and significant effects of average exchange-rate volatility of both exporter and importer for several years.

Insert Table 4 about here.

In fact, the effect of bilateral exchange-rate volatility turns out significant and positive in four years (1992, 1995, 1996 and 1998) whereas it is estimated as significantly negative only in one year (1991). This can be due to the inclusion of additional Central and Eastern European countries, with high trade growth and high exchange-rate fluctuations. Indeed, the bilateral exchange rate has the correct (negative) sign when we estimate (3) with the

restricted sample at the beginning of the analyzed period, although the estimated coefficient is again not robust in the subsequent years.[18]

Importantly, the inclusion of additional variables has little effect on our estimates of home bias for the former federations in Eastern Europe (and especially so for Slovenia-Croatia and the former Czechoslovakia). For most of the analyzed period, the estimates of home bias differs little whether estimated with the traditional or augmented gravity model. Hence, the relative remoteness of these countries and the exchange-rate volatility after the break-up do note explain the size of this bias. Given the overall low robustness of these additional variables, the traditional specification of the gravity model seems to be more appropriate for this kind of analysis.

Further possible sophistications of the gravity model concern the estimation technique. So far, we estimated gravity models in a series of independent cross sections for individual years. Baldwin (1994), Mátyás (1997) and Cheng and Wall (1999) argue that instead panel-data techniques are more appropriate. In particular, Cheng and Wall (1999) argue that, in cross-section analysis, the gravity model yields biased estimates, which tend to overestimate trade between low-trade countries and to underestimate it between high trade countries.

Therefore, we estimate the gravity model in three alternative specifications (see Table 5): (a) pooled cross section, (b) fixed effects model with time effects for individual years (t_i), and (c) fixed effect model with country effects (f_{ij}).

$$M = b_1 + b_2 Y_M + b_3 Y_X + b_4 d + b_5 s_{ij} + \sum_{j=X,M} b_j s_j + \sum_{i=X,M} b_i \log(R_i) + \sum_k b_k D_k + e \text{ (4a)}$$

$$M = \sum_{t=1990}^{1998} t_t + b_2 Y_M + b_3 Y_X + b_4 d + b_5 s_{ij} + \sum_{j=X,M} b_j s_j + \sum_{i=X,M} b_i \log(R_i) + \sum_k b_k D_k + e \text{ (4b)}$$

$$M = \sum_i \sum_j f_{ij} + b_2 Y_M + b_3 Y_X + b_5 s_{ij} + \sum_{j=X,M} b_j s_j + \sum_k b_k D_k + e \qquad \text{(4c)}$$

Following Cheng and Wall (1999), we formulate fixed effects for each of approximately 1300 pairs of trade partners and for both directions of trade flows, i.e.

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[18] These results are available from the authors on request.

$\phi_{ij} \neq \phi_{ij}$. The set of fixed country and time effects replaces the constant in the equation. We measure the effects of disintegration by including a set of dummy variables for selected groups of countries in each available year. This set is multicollinear with the fixed country effects, therefore, we drop one fixed effect for each group of countries created from former multinational federations. The fixed country effects reflect all factors, which are constant for a given pair of countries. Therefore, we have to drop distance, participation in various free trade agreements, and measures of remoteness in the third specification. Time effects (not reported in the Table) in general do not seem important for explanation of trade between 1990 and 1998.

Insert Table 5 about here.

Indeed, the gravity models estimated for panel data perform slightly better than cross-section estimates. In particular, the average volatility of exchange rates of importing and exporting country has the correct sign (negative) and is highly significant in the regression with country effects. In contrast, volatility of the bilateral exchange rate still has the wrong sign (and is significant). Most importantly, the fixed effect estimation of gravity models confirm our conclusions regarding home bias in the former federations. The main difference is that the home bias estimated with fixed country effects for the former Czechoslovakia and Slovenia-Croatia appears higher than the estimates obtained in cross section. Nevertheless, the evolution of the home bias is essentially the same. In all countries, trade intensity declined dramatically after disintegration.

8   Conclusions

Our objective in this paper was to investigate the impact of disintegration on trade. Unlike the impact of integration, the economic consequences of disintegration have been little explored in the literature. We study three recent disintegration episodes in Europe—the break-ups of the Soviet Union, Yugoslavia and Czechoslovakia between 1991 and 1993. Using the gravity model of trade, we assess the evolution of trade relations among the former constituent Republics of these federations in the wake of disintegration. We find evidence of a strong home bias in the former federations: around the time of disintegration, trade between the constituent parts of Czechoslovakia, Soviet Union (represented here by

Belarus, Russia and Ukraine) and the Baltic countries was approximately 43 times greater than trade with third countries (controlling for GDP and distance). The home bias was lower in Slovenia and Croatia, with their bilateral trade exceeding normal trade *only* 24 times in 1990. Disintegration was followed by a sharp deterioration of this home bias. Nevertheless, traditional relations die hard, and, by 1998, trade within the former federations exceeded normal trade twice for Slovenia-Croatia, seven times for the former Czechoslovakia, 13 times for the Baltics, and 30 times for Belarus-Russia-Ukraine.

As the evidence from German reunification suggests, integration (or reintegration in this specific case) is followed by an increase in bilateral trade. However, the home bias estimated for trade between West Germany and the former GDR is dwarfed by the results for the former federations in Eastern Europe and even falls short of the home bias estimated for West Germany by Nitsch (1998). Indeed, the data indicate that the intensity of West German exports to the former GDR declined gradually between 1991 and 1994. On the other hand, the increase of East German exports has been much more modest.

In comparison to the formal preferential-trade areas in Eastern and Western Europe, trade relations among the former constituent Republics of demised federations appear very strong. The difference is particularly pronounced with respect to the intra-EU trade—we found that EU membership on average increases bilateral trade only 1.5 times. Trade intensity in the former federations continues to be high despite greater open and hidden barriers to trade among the successor countries, transaction costs, exchange rate uncertainty and political instability. Hence, the legacy of common past and traditional relations have very strong effects on international trade, apparently much stronger that the effect of formal trade liberalization.

These results suggest that although disintegration is associated with sharp deterioration of bilateral trade intensity, the relations between former constituent parts of a federation retain some of their specific nature for several years after splitting up. The outside economic and political environment seems to matter as well. The Czech and Slovak Republics, which have better access to major Western European markets, experienced a deeper collapse of bilateral trade than the Baltics or Belarus, Russia and Ukraine, despite generally lower barriers to trade in the former Czechoslovakia. The prospects of an early EU membership

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for the Czech Republic, Slovenia and Estonia may have contributed to the further deterioration of trade with their traditional partners in the late 1990s. In contrast, trade intensity among Belarus, Russia and Ukraine actually increased in 1998, possibly as a consequence of the Russian crises, and efforts towards re-unification between Russia and Belarus. Hence, while disintegration matters, the overall context is important as well.

Our findings are broadly consistent with earlier findings on currency unions. In particular, Rose (2000) shows that a common currency increases bilateral trade flows approximately three times. Indeed, we found a decline of bilateral trade intensity by about this factor in the first years of the existence of the new independent states. However, we cannot separate the effect of currency separation from the effect of political disintegration as both effects occurred simultaneously in the countries under scrutiny. However, we do not find a significant effect of the volatility of exchange rates on bilateral trade within our data set.

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Figure 1: Disintegration in Eastern Europe, Full Sample

Former Czechoslovakia

Slovenia-Croatia

Russia-Ukraine-Belarus

Baltic States
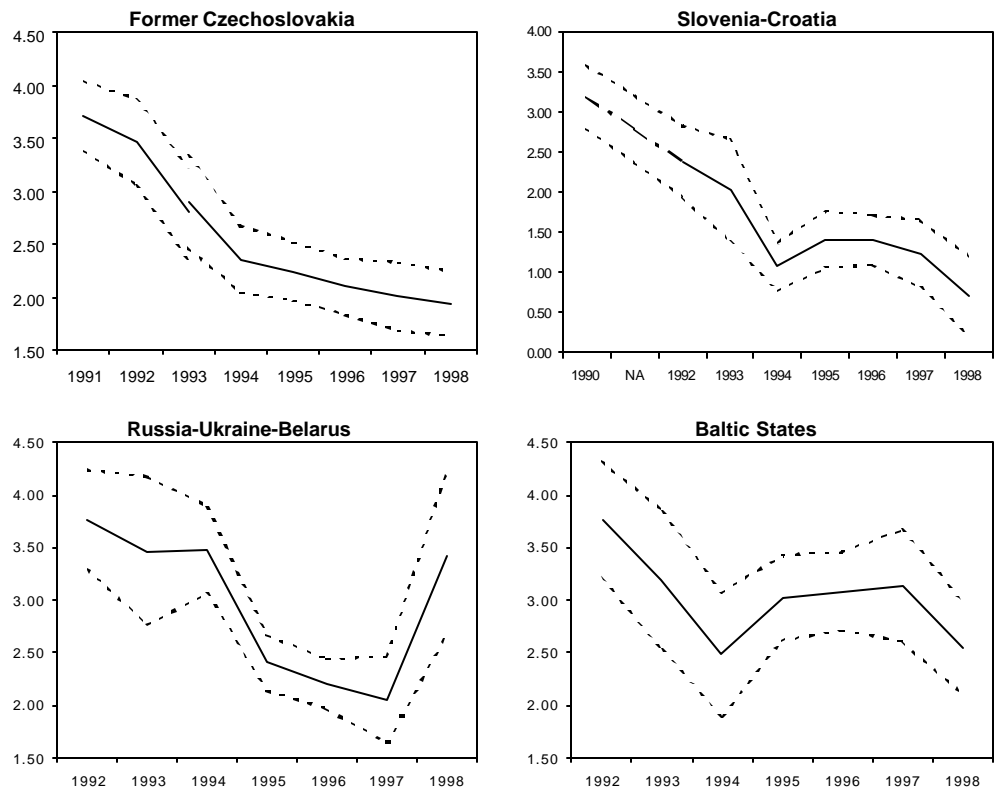
Note: We use estimates for trade flows between the Czech Republic and Slovakia according to delivery statistics of large enterprises in Slovakia (1991-1993), which are not fully comparable to later custom statistics (1993-1997) causing a discontinuity in our estimates in 1993. Trade flows between Slovenia and Croatia in 1990 are according to Mencinger (1998) and WIIW (1999), while trade data on 1991 are not available.

Figure 2: German Reunification, Restricted Sample

West German Exports to New Bundesländer

West German Imports from New Bundesländer
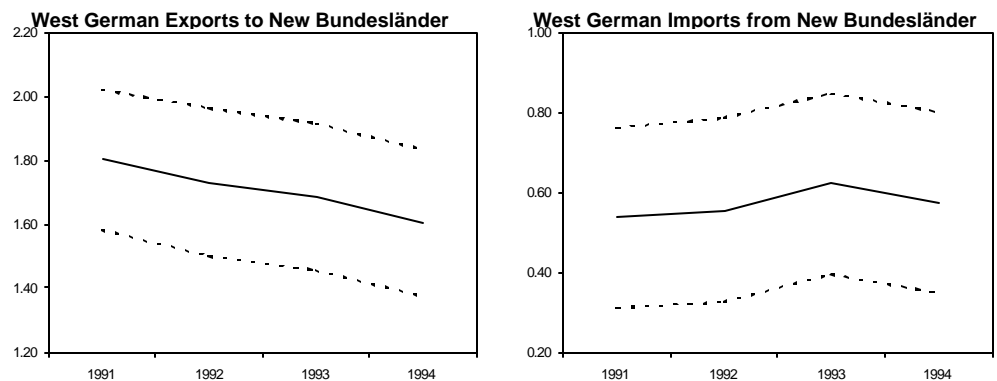
Figure 3: Trade Liberalization in Eastern Europe
A: Restricted Sample[*]   B: Full Sample
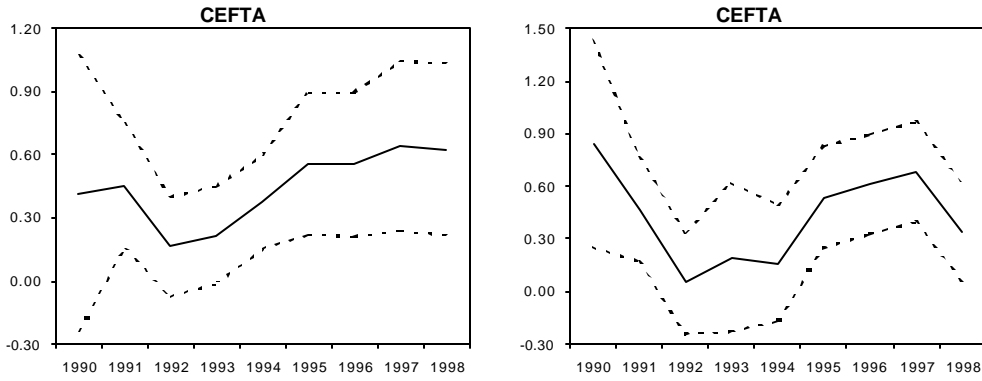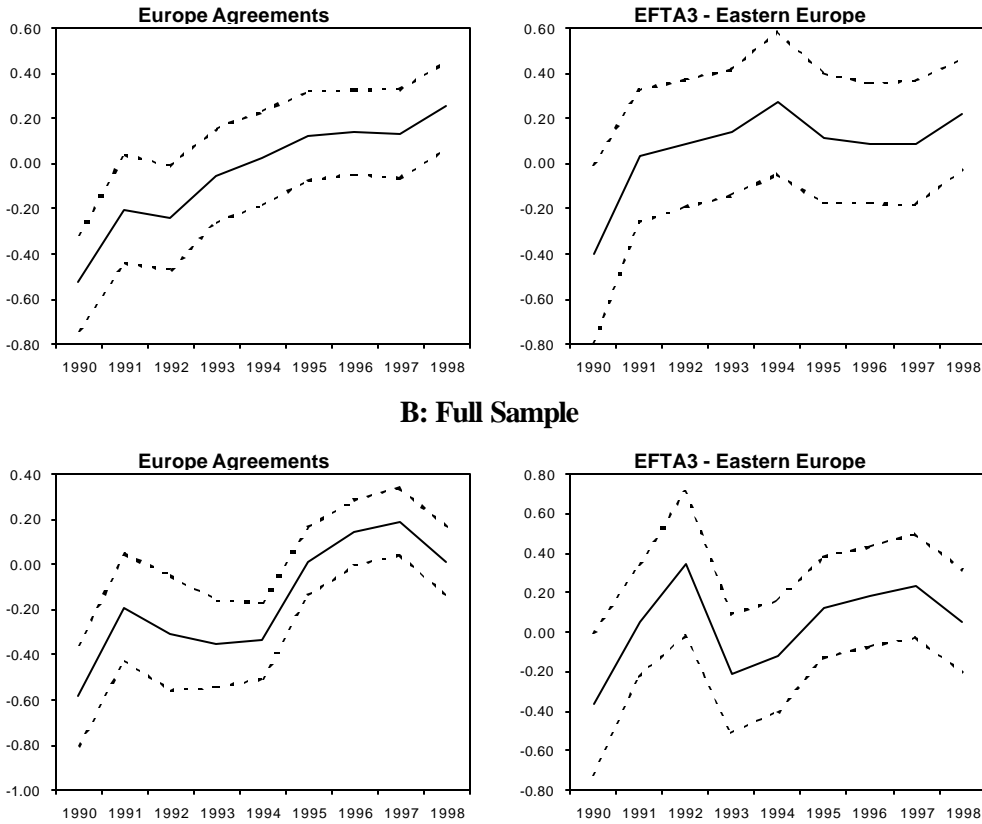
CEFTA

CEFTA

Note: [*] The restricted sample only contains bilateral trade flows that are available during the whole period 1990-1998.

Figure 4: Trade Relations between East and West
A: Restricted Sample

Europe Agreements

EFTA3 - Eastern Europe

B: Full Sample

Europe Agreements

EFTA3 - Eastern Europe

Note: [*] The restricted sample only contains bilateral trade flows that are available during the whole period 1990-1998.

Figure 5: Free Trade Areas in Western Europe, Restricted Sample[*]
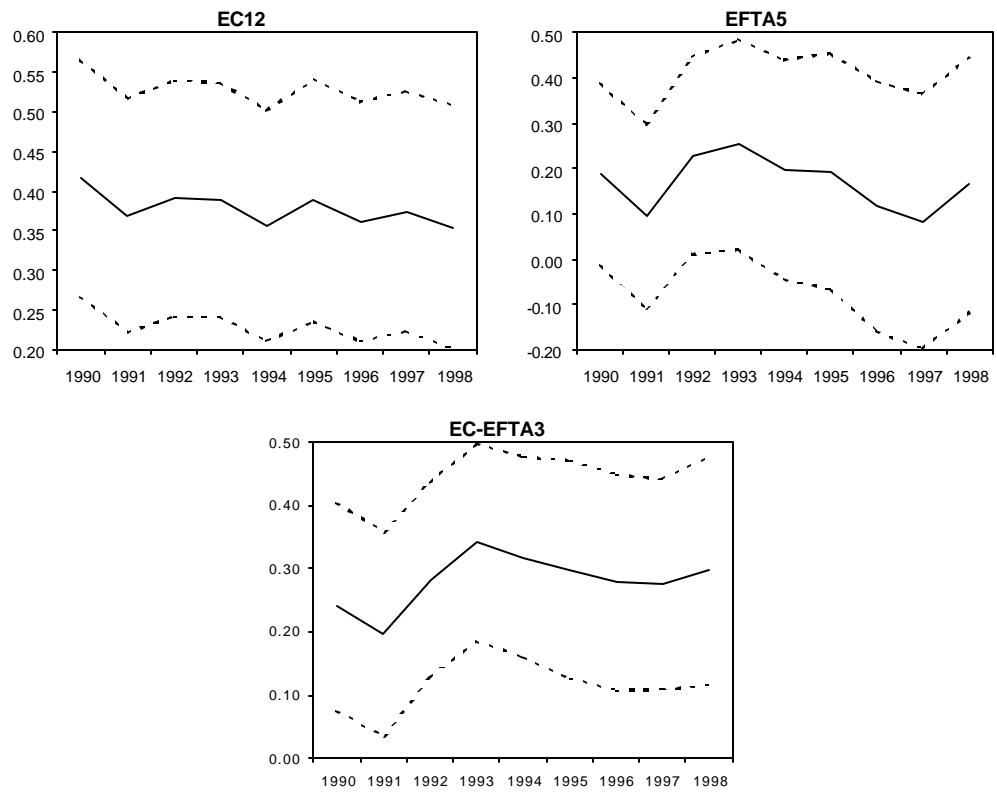
Note: [*] The restricted sample only contains bilateral trade flows that are available during the whole period 1990-1998.

Table 1 Gravity Model of Trade Flows, Restricted Sample

	1990	1991	1992	1993	1994	1995	1996	1997	1998
No. of observations	630	630	630	630	630	630	630	630	630
Adjusted R^2	0.8698	0.8853	0.8358	0.8029	0.8361	0.8479	0.8478	0.8407	0.8161
Constant	3.346	3.659	3.796	3.765	3.519	3.285	3.480	3.604	3.552
	(8.742)	(9.540)	(10.251)	(10.358)	(9.962)	(9.128)	(10.121)	(10.519)	(10.242)
GDP of importing country	0.875	0.839	0.838	0.838	0.850	0.868	0.861	0.857	0.845
	(36.485)	(35.237)	(36.879)	(36.946)	(36.663)	(37.394)	(39.104)	(37.823)	(35.882)
GDP of exporting country	0.913	0.894	0.909	0.925	0.911	0.922	0.921	0.909	0.902
	(40.054)	(44.008)	(43.995)	(45.415)	(45.092)	(42.083)	(44.140)	(44.257)	(40.754)
Distance	-0.866	-0.872	-0.884	-0.900	-0.881	-0.876	-0.888	-0.875	-0.868
	(-21.313)	(-21.950)	(-22.333)	(-22.616)	(-22.308)	(-21.557)	(-22.887)	(-22.214)	(-21.796)
Dummy: Common border	0.406	0.445	0.427	0.398	0.421	0.385	0.389	0.397	0.386
	(3.617)	(3.606)	(3.257)	(3.084)	(3.241)	(3.185)	(3.359)	(3.589)	(3.332)
Dummy: English speaking countries	1.136	1.109	1.105	1.174	1.180	1.251	1.154	1.130	1.276
	(6.178)	(5.953)	(5.469)	(6.122)	(6.262)	(6.946)	(6.397)	(6.065)	(7.001)
Dummy: EC12	0.417	0.370	0.391	0.389	0.357	0.388	0.361	0.375	0.355
	(5.459)	(4.892)	(5.134)	(5.134)	(4.779)	(4.961)	(4.669)	(4.836)	(4.517)
Dummy: CEFTA	0.418	0.451	0.164	0.217	0.378	0.557	0.554	0.641	0.626
	(1.249)	(2.960)	(1.353)	(1.825)	(3.257)	(3.213)	(3.159)	(3.094)	(2.997)
Dummy: Europe Agreements	-0.528	-0.201	-0.240	-0.052	0.025	0.124	0.140	0.132	0.259
	(-4.832)	(-1.626)	(-2.027)	(-0.484)	(0.237)	(1.220)	(1.466)	(1.310)	(2.632)
Dummy: EFTA	0.189	0.094	0.228	0.253	0.198	0.195	0.116	0.083	0.165
	(1.845)	(0.900)	(2.041)	(2.138)	(1.592)	(1.463)	(0.823)	(0.578)	(1.147)
Dummy: EC12- EFTA3	0.240	0.196	0.281	0.342	0.319	0.299	0.279	0.275	0.297
	(2.836)	(2.374)	(3.550)	(4.267)	(3.924)	(3.379)	(3.180)	(3.224)	(3.201)
Dummy: EFTA3-Associated countries	-0.400	0.034	0.091	0.137	0.271	0.112	0.090	0.092	0.219
	(-1.975)	(0.225)	(0.628)	(0.959)	(1.671)	(0.759)	(0.659)	(0.652)	(1.749)

Notes: T-statistics (heteroscedasticity robust) in parentheses. Estimated on bilateral trade flows among OECD countries (excl. Mexico and Korea), and Central and Eastern European countries. CEFTA includes the Czech Republic, Hungary, Poland, Slovakia and Slovenia. EC12 refers to the 12 countries who were the members of the European Community until 1995. EFTA includes EFTA3 (Austria, Finland, and Sweden) and Norway and Switzerland. Associated countries are Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia.

Table 2 Gravity Model of Trade Flows, Full Sample

	1990	1991	1992	1993	1994	1995	1996	1997	1998
No. of observations	670	643	836	1140	1219	1248	1247	1238	1247
Adjusted R^2	0.8698	0.8853	0.8358	0.8029	0.8361	0.8479	0.8478	0.8407	0.8161
Constant	3.372	3.663	4.426	4.691	4.786	4.206	4.136	4.311	4.776
	(8.400)	(9.613)	(10.137)	(13.123)	(15.977)	(14.610)	(14.887)	(15.281)	(15.036)
GDP of importing country	0.873	0.852	0.903	0.838	0.845	0.873	0.853	0.855	0.823
	(35.596)	(36.001)	(38.751)	(43.194)	(47.957)	(51.761)	(50.953)	(51.032)	(40.779)
GDP of exporting country	0.924	0.899	0.865	0.872	0.860	0.939	0.959	0.958	0.935
	(40.777)	(44.504)	(36.782)	(44.072)	(48.944)	(55.925)	(57.897)	(54.998)	(45.399)
Distance	-0.877	-0.886	-0.976	-0.988	-1.007	-1.024	-1.016	-1.025	-1.040
	(-21.689)	(-21.920)	(-20.744)	(-24.005)	(-26.899)	(-28.098)	(-28.010)	(-27.599)	(-23.753)
Dummy: Common border	0.317	0.454	0.608	0.537	0.760	0.664	0.631	0.595	0.670
	(2.552)	(3.706)	(3.575)	(2.251)	(5.691)	(5.567)	(5.712)	(5.364)	(5.009)
Dummy: English speaking countries	1.169	1.128	1.179	1.342	1.360	1.536	1.479	1.493	1.535
	(6.381)	(6.048)	(5.828)	(7.333)	(7.557)	(8.713)	(8.273)	(7.980)	(8.498)
Dummy: EC12	0.437	0.364	0.288	0.377	0.289	0.396	0.447	0.471	0.309
	(5.650)	(4.821)	(3.498)	(4.570)	(3.852)	(5.070)	(5.815)	(6.143)	(3.730)
Dummy: CEFTA	0.842	0.466	0.050	0.195	0.163	0.537	0.613	0.681	0.344
	(2.783)	(3.051)	(0.334)	(0.901)	(0.965)	(3.627)	(4.227)	(4.653)	(2.387)
Dummy: Europe Agreements	-0.580	-0.190	-0.303	-0.351	-0.337	0.015	0.141	0.193	0.014
	(-5.114)	(-1.564)	(-2.329)	(-3.573)	(-3.875)	(0.191)	(1.889)	(2.524)	(0.177)
Dummy: EFTA	0.230	0.089	0.070	0.158	-0.022	0.099	0.120	0.110	-0.011
	(2.100)	(0.876)	(0.637)	(1.104)	(-0.209)	(0.881)	(0.985)	(0.880)	(-0.087)
Dummy: EC12- EFTA3	0.245	0.190	0.233	0.344	0.294	0.375	0.409	0.411	0.306
	(2.896)	(2.310)	(2.771)	(4.448)	(3.684)	(4.230)	(4.714)	(4.803)	(3.174)
Dummy: EFTA3-Associated countries	-0.364	0.057	0.350	-0.207	-0.119	0.127	0.181	0.237	0.055
	(-1.982)	(0.392)	(1.879)	(-1.344)	(-0.828)	(0.966)	(1.393)	(1.766)	(0.415)
Dummy: Baltic States			3.766	3.188	2.485	3.024	3.088	3.142	2.556
			(13.130)	(9.454)	(8.241)	(14.533)	(16.165)	(11.585)	(11.202)
Dummy: Russia-Belarus- Ukraine			3.771	3.467	3.480	2.407	2.207	2.057	3.427
			(15.740)	(9.596)	(16.561)	(18.024)	(18.347)	(9.807)	(8.663)
Dummy: Slovenia-Croatia			2.382	2.021	1.075	1.413	1.404	1.231	0.708
			(10.535)	(6.124)	(7.004)	(7.823)	(8.872)	(5.695)	(2.810)
Dummy: Former Czechoslovakia				2.905	2.359	2.245	2.099	2.006	1.939
				(12.968)	(14.550)	(15.885)	(15.472)	(12.224)	(12.350)

Notes: See Table 1.

Table 3 Gravity Model of Trade Flows, Using Alternative Estimates of Trade Flows between Selected Pairs of Countries

	1990[SLO]	1991[CS]	1992[CS]	1993[CS]	1991[GE]	1992[GE]	1993[GE]	1994[GE]
No. of observations	672	645	838	1140	632	632	632	632
Adjusted R^2	0.8699	0.8855	0.8360	0.8028	0.8825	0.8805	0.8803	0.8786
Constant	3.372	3.663	4.426	4.691	3.659	3.796	3.765	3.519
	(8.400)	(9.613)	(10.137)	(13.123)	(9.540)	(10.251)	(10.358)	(9.962)
GDP of importing country	0.873	0.852	0.903	0.838	0.839	0.838	0.838	0.850
	(35.596)	(36.005)	(38.752)	(43.195)	(35.237)	(36.879)	(36.947)	(36.663)
GDP of exporting country	0.924	0.899	0.865	0.872	0.894	0.909	0.925	0.911
	(40.780)	(44.510)	(36.787)	(44.071)	(44.008)	(43.995)	(45.415)	(45.092)
Distance	-0.877	-0.886	-0.976	-0.988	-0.872	-0.884	-0.900	-0.881
	(-21.689)	(-21.920)	(-20.744)	(-24.005)	(-21.950)	(-22.333)	(-22.616)	(-22.308)
Dummy: Common border	0.317	0.454	0.608	0.537	0.445	0.427	0.398	0.421
	(2.552)	(3.706)	(3.575)	(2.251)	(3.606)	(3.257)	(3.084)	(3.241)
Dummy: English speaking Countries	1.169	1.128	1.179	1.342	1.109	1.105	1.174	1.180
	(6.381)	(6.048)	(5.828)	(7.333)	(5.953)	(5.469)	(6.122)	(6.262)
Dummy: EC12	0.437	0.364	0.288	0.377	0.370	0.391	0.389	0.357
	(5.650)	(4.821)	(3.498)	(4.570)	(4.892)	(5.134)	(5.134)	(4.779)
Dummy: CEFTA	0.842	0.466	0.050	0.195	0.451	0.164	0.217	0.378
	(2.783)	(3.051)	(0.334)	(0.901)	(2.960)	(1.353)	(1.825)	(3.257)
Dummy: Europe Agreements	-0.580	-0.190	-0.303	-0.351	-0.201	-0.240	-0.052	0.025
	(-5.114)	(-1.564)	(-2.329)	(-3.573)	(-1.626)	(-2.027)	(-0.484)	(0.237)
Dummy: EFTA	0.230	0.089	0.070	0.158	0.094	0.228	0.253	0.198
	(2.100)	(0.876)	(0.637)	(1.104)	(0.900)	(2.041)	(2.138)	(1.592)
Dummy: EC12- EFTA3	0.245	0.190	0.233	0.344	0.196	0.281	0.342	0.319
	(2.896)	(2.310)	(2.771)	(4.448)	(2.374)	(3.550)	(4.267)	(3.924)
Dummy: EFTA 3-Associated Countries	-0.364	0.057	0.350	-0.207	0.034	0.091	0.137	0.271
	(-1.982)	(0.392)	(1.879)	(-1.344)	(0.225)	(0.628)	(0.959)	(1.671)
Dummy: Baltic States			3.767	3.188				
			(13.130)	(9.454)				
Dummy: Russia-Belarus-Ukraine			3.771	3.467				
			(15.741)	(9.596)				
Dummy: Slovenia-Croatia	3.184		2.382	2.021				
	(15.746)		(10.535)	(6.124)				
Dummy: Former Czechoslovakia		3.713	3.466	2.798				
		(22.106)	(16.628)	(12.568)				
Dummy: West German Exports to former East Germany					1.801	1.731	1.685	1.603
					(16.039)	(14.610)	(14.344)	(13.608)
Dummy: West German Imports from former East Germany					0.536	0.555	0.621	0.574
					(4.645)	(4.710)	(5.355)	(4.934)

Notes: See Table 1. [SLO] Estimates of trade flows between Slovenia and Croatia according to Mencinger (1998) and WIIW (1999). [CS] Enterprise delivery statistics as estimates of trade flows between the Czech Republic and Slovakia for 1991-1993. [GE] Trade flows (including services) between West Germany and former East Germany according to German Statistical Office.

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Table 4 Augmented Gravity Model of Trade Flows, Full Sample

	1990	1991	1992	1993	1994	1995	1996	1997	1998
No. of observations	619	643	641	1140	1219	1248	1247	1238	1247
Adjusted R^2	0.8735	0.8902	0.8851	0.8076	0.8414	0.8505	0.8514	0.8420	0.8296
Constant	-9.316	-9.096	-9.179	-6.527	-3.452	-2.618	-2.135	-2.447	-1.945
	(-3.335)	(-3.080)	(-3.059)	(-2.243)	(-1.171)	(-0.891)	(-0.770)	(-0.896)	(-0.686)
GDP of importing country	0.926	0.898	0.897	0.896	0.887	0.889	0.879	0.874	0.869
	(35.056)	(35.308)	(37.964)	(41.257)	(47.113)	(49.260)	(48.327)	(46.396)	(44.382)
GDP of exporting country	0.937	0.958	0.960	0.928	0.904	0.955	0.993	0.989	0.993
	(37.734)	(40.921)	(45.392)	(44.013)	(47.694)	(52.977)	(54.431)	(49.454)	(45.503)
Distance	-0.989	-1.043	-1.094	-1.080	-1.100	-1.118	-1.118	-1.109	-1.128
	(-17.841)	(-16.903)	(-18.769)	(-22.595)	(-24.946)	(-25.564)	(-26.365)	(-26.374)	(-24.533)
Remoteness of importing country	0.867	0.741	0.838	0.620	0.480	0.462	0.395	0.399	0.165
	(4.094)	(3.168)	(3.525)	(2.593)	(1.985)	(1.938)	(1.783)	(1.799)	(0.699)
Remoteness of exporting country	0.614	0.737	0.794	0.604	0.474	0.399	0.436	0.430	0.617
	(3.166)	(3.529)	(3.756)	(3.040)	(2.416)	(1.965)	(2.326)	(2.314)	(3.047)
Volatility of bilateral exch. rate	-0.081	-0.041	0.110	-0.031	0.047	0.146	0.311	0.037	0.087
	(-0.890)	(-1.725)	(2.204)	(-0.669)	(0.851)	(3.681)	(3.276)	(1.318)	(2.021)
Average exchange rate volatility of importing country	0.076	0.043	-0.097	0.057	-0.011	-0.106	-0.296	-0.038	-0.052
	(0.797)	(1.744)	(-1.593)	(1.134)	(-0.185)	(-1.943)	(-2.997)	(-1.334)	(-1.080)
Average exchange rate volatility of exporting country	0.063	0.047	-0.102	0.054	-0.015	-0.116	-0.276	-0.027	-0.047
	(0.655)	(1.876)	(-1.890)	(1.083)	(-0.251)	(-1.953)	(-2.763)	(-0.929)	(-1.003)
Dummy: Common border	0.194	0.241	0.270	0.410	0.666	0.585	0.583	0.533	0.549
	(1.628)	(1.922)	(1.948)	(1.669)	(4.893)	(4.932)	(5.085)	(4.620)	(4.495)
Dummy: English speaking countries	0.863	0.888	1.051	1.185	1.329	1.540	1.496	1.427	1.559
	(5.800)	(5.522)	(5.850)	(7.169)	(7.792)	(9.201)	(8.539)	(8.163)	(8.312)
Dummy: EC12	0.388	0.347	0.385	0.407	0.370	0.430	0.488	0.484	0.459
	(4.802)	(4.474)	(4.814)	(4.776)	(4.675)	(5.374)	(6.067)	(6.076)	(5.210)
Dummy: CEFTA	1.011	0.548	0.194	0.461	0.374	0.562	0.666	0.719	0.562
	(3.215)	(3.700)	(1.598)	(2.052)	(2.233)	(3.839)	(4.461)	(4.907)	(4.102)
Dummy: Europe Agreements	-0.368	-0.053	-0.257	-0.163	-0.186	0.085	0.160	0.209	0.222
	(-2.646)	(-0.426)	(-2.167)	(-1.626)	(-2.206)	(1.122)	(2.203)	(2.761)	(2.789)
Dummy: EFTA	0.199	0.129	0.223	0.255	0.085	0.175	0.130	0.121	0.171
	(1.755)	(1.180)	(1.937)	(1.700)	(0.780)	(1.618)	(1.045)	(0.932)	(1.308)
Dummy: EC12- EFTA3	0.224	0.217	0.305	0.418	0.386	0.442	0.447	0.443	0.472
	(2.477)	(2.483)	(3.671)	(4.989)	(4.640)	(4.842)	(5.087)	(4.961)	(4.752)
Dummy: EFTA3-Associated Countries	-0.164	0.156	0.087	-0.044	-0.014	0.143	0.133	0.212	0.254
	(-0.797)	(1.036)	(0.592)	(-0.276)	(-0.100)	(1.095)	(1.024)	(1.546)	(1.887)

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Table 4: Continued

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Dummy: Baltic States				3.558	2.802	3.004	3.184	3.187	2.955
				(10.043)	(9.501)	(16.164)	(17.081)	(11.819)	(13.712)
Dummy: Russia-Belarus-Ukraine				2.347	3.023	2.452	2.195	2.000	3.253
				(4.273)	(9.341)	(10.982)	(15.261)	(9.782)	(5.196)
Dummy: Slovenia-Croatia				2.158	1.286	1.543	1.573	1.178	1.045
				(5.939)	(8.247)	(8.546)	(9.473)	(5.046)	(4.220)
Dummy: Former Czechoslovakia				2.920	2.412	2.359	2.123	1.994	1.979
				(12.807)	(15.079)	(16.325)	(15.267)	(12.472)	(13.373)

Notes: See Table 1.

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Table 5 Augmented Gravity Model of Trade Flows, Panel Data

	Pooled Data [a]	Time Effects [b]	Country effects [c]
No. of observations	9242	9242	9242
Adjusted R^2	0.8448	0.8455	0.9703
GDP of importing country	0.884	0.881	0.873
	(123.633)	(123.659)	(27.269)
GDP of exporting country	0.956	0.953	0.362
	(131.065)	(131.372)	(11.730)
Distance	-1.092	-1.098	
	(-68.733)	(-68.307)	
Dummy: Common border	0.490	0.498	
	(9.705)	(9.700)	
Dummy: English speaking countries	1.259	1.272	
	(22.764)	(22.322)	
Dummy: EC12	0.406	0.397	
	(15.148)	(14.741)	
Dummy: CEFTA	0.554	0.544	
	(9.284)	(9.031)	
Dummy: Europe Agreements	-0.057	-0.068	
	(-1.881)	(-2.233)	
Dummy: EFTA	0.139	0.120	
	(3.406)	(2.959)	
Dummy: EC12- EFTA3	0.367	0.357	
	(12.457)	(12.122)	
Dummy: EFTA3-Associated Countries	0.045	0.029	
	(0.902)	(0.582)	
Remoteness of importing country	0.524	0.523	
	(6.723)	(6.697)	
Remoteness of exporting country	0.549	0.549	
	(8.217)	(8.180)	
Volatility of bilateral exch. rate	0.009	0.038	0.013
	(1.924)	(2.309)	(6.353)
Average exchange rate volatility of importing country	0.003	-0.029	-0.008
	(0.632)	(-1.616)	(-3.577)
Average exchange rate volatility of exporting country	0.007	-0.025	-0.012
	(1.440)	(-1.405)	(-5.059)

Table 5: Continued

	Pooled Data [a]	Time Effects [b]	Country effects [c]
Dummy for CSFR, 1993	2.756	2.724	3.793
	(44.843)	(38.465)	(33.028)
Dummy for CSFR, 1994	2.407	2.410	3.475
	(38.251)	(35.291)	(28.081)
Dummy for CSFR, 1995	2.277	2.353	3.409
	(33.896)	(32.842)	(25.319)
Dummy for CSFR, 1996	2.142	2.189	3.322
	(37.074)	(35.136)	(26.495)
Dummy for CSFR, 1997	2.170	2.152	3.384
	(19.014)	(18.458)	(25.262)
Dummy for CSFR, 1998	1.999	1.957	3.313
	(17.781)	(16.919)	(22.571)
Dummy for SLO-HR, 1993	2.109	2.029	3.692
	(20.953)	(17.954)	(35.447)
Dummy for SLO-HR, 1994	1.511	1.495	3.131
	(21.269)	(19.901)	(25.883)
Dummy for SLO-HR, 1995	1.423	1.499	3.111
	(10.482)	(10.882)	(29.838)
Dummy for SLO-HR, 1996	1.353	1.396	3.049
	(11.803)	(11.990)	(28.386)
Dummy for SLO-HR, 1997	1.197	1.140	2.962
	(6.296)	(5.930)	(25.889)
Dummy for SLO-HR, 1998	1.019	0.967	2.815
	(4.875)	(4.590)	(19.506)
Dummy for Baltic States, 1993	3.557	3.479	3.114
	(17.853)	(17.276)	(20.814)
Dummy for Baltic States, 1994	3.041	3.008	2.748
	(13.076)	(12.866)	(17.325)
Dummy for Baltic States, 1995	3.001	3.033	2.814
	(19.714)	(19.883)	(17.535)
Dummy for Baltic States, 1996	3.027	3.054	2.925
	(20.483)	(20.429)	(19.730)
Dummy for Baltic States, 1997	3.139	3.092	3.122
	(13.298)	(13.221)	(18.135)
Dummy for Baltic States, 1998	2.854	2.795	3.000
	(15.686)	(15.249)	(12.563)
Dummy for CIS, 1993	3.140	3.418	2.760
	(14.136)	(12.409)	(11.185)
Dummy for CIS, 1994	3.626	3.715	2.956
	(17.959)	(18.931)	(13.871)
Dummy for CIS, 1995	2.299	2.426	2.086
	(27.969)	(26.481)	(7.670)
Dummy for CIS, 1996	2.088	2.139	1.940
	(24.845)	(23.957)	(8.023)
Dummy for CIS, 1997	1.952	1.939	1.934
	(10.634)	(10.749)	(7.852)
Dummy for CIS, 1998	3.263	3.565	3.041
	(9.243)	(8.681)	(9.994)

Notes: See Table 1. [a] constant not reported, [b] time effects not reported, [c] country effects not reported.

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