What Happened to Trade in Western and Eastern Europe in the Aftermath of COMECON?

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Abstract

This paper provides an ex-post analysis of within and between Western and Eastern European trade since the fall of the Iron Curtain. In the early 1990s, leading economists have predicted huge un-exhausted trade potentials associated with the political restraints under the COMECON regime. Besides the political regulation of West-East and also intra-East trade per se, two major sources of un-exhausted trade potentials are the low eastern per-capita GDP figures associated with limited access to frontier technologies and West-East discrepancies in the behavioral relationships (i.e., the elasticities of East-West trade with respect to the key determinants of trade flows). After the fall of the iron curtain, West-East trade grew persistently faster than trade between the Western economies. Estimated potential West-East trade was found to rapidly approach and even overshoot actual trade volumes. This paper addresses the question of whether changes in the determinants of trade like market size and relative factor endowments or economic behavior (the different sensitivities of trade to its determinants) were responsible for these findings. Our empirical evidence from a large panel of bilateral European trade flows suggests that the conclusions differ sharply for West-East versus intra-East trade.

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1. Introduction

> "*... sound international trade relations are likely to offer a far greater stimulus to the Soviet Union and Eastern European economies than could any conceivable aid flow.*" (Hamilton and Winters, 1992)

Immediately after the fall of the iron curtain, international economists have started out to quantify potential trade between the western economies (particularly the EU but also the OECD in general) and the Central and Eastern European ones (CEEC). In this regard, Hamilton and Winters (1992), Wang and Winters (1992), and Baldwin (1994) are generally credited with the most influential contributions. Three reasons have been identified, why central planning in the East has lead actual trade with the western market economies to fall short of "potential" or "natural" trade. First and most importantly, East-West trade was directly suppressed by explicit government policies. Second, central planning influenced important behavioral relationships, so that most researchers did not expect the core determinants (such as country size or trade costs) to have the same impact on trade in the East than in the West, causing an indirect effect on actual East-West trade. Third, the use of inferior technologies caused GDP growth to considerably lag behind that of the western market economies, so that trade would have been lower because of sheer demand and supply in the CEEC, even without the direct political restraint to trade.

This reasoning had two consequences for the empirical strategy to quantifying potential East-West trade. On the one hand, the behavioral relationship between the explanatory variables and trade volumes had to be based on western trade patterns only. All important applications have used the gravity model (see Anderson, 1979, Bergstrand, 1985) as the work-horse model to characterize the relationship between GDP, population and trade frictions as the explanatory factors and trade volumes as the dependent variable in equilibrium (see Hamilton and Winters, 1992, Wang and Winters, 1992, Baldwin, 1994). The western trade elasticities were then applied on the observed determinants of West-East trade. In this way, an estimate of potential or "natural" trade was produced, which by definition was not affected by the above mentioned first and second restraint to East-West trade. On the other hand, medium-term projections of economic output had to be used to account for the catching-up process in Eastern Europe, associated with the technological and systemic transformation there

(Baldwin, 1994, Baldwin et al., 1997). This was eager to additionally overcome the third remaining affect of central planning, related to the use of inferior technologies.

All influential early contributions came to the conclusion that the political restraints on East-West had exerted substantial trade diverting effects and that the fall of the iron curtain, sooner or later, should be expected to result in a considerable expansion of East-West trade both in absolute terms but also relative to trade between the western market economies. More recent research on this issue has claimed that actual East-West trade almost (Nilsson, 2000) or even completely (Gros and Gonciarz, 1996) matched potential trade patterns by the mid 1990s. However, in the details on the latter the literature is somewhat inconclusive (see the discussions by Baldwin, 1997, Kellmann, 1997), but there is now a general agreement on the rapid adjustment towards exhausting trade potentials (see Gros and Gonciarz, 1997).

Research since the mid 1990s has shed further light on West-East trade based on more recent data, providing evidence on the closure of the gap between potential and actual East-West trade. However, a thorough analysis of the driving forces behind this process seems not available so far. It is this paper's attempt to fill this gap. Especially, we investigate the role played by two different kinds of effects for the growth of West-East and intra-East trade: changes in the behavioral parameters related to the CEEC economic activity as compared to activities in the West (technically, this means a change in the regression coefficients in East-West trade or intra-East trade as compared to intra-West goods transactions), and changes in the main determinants of East-West (or intra-East) versus intra-West trade. For this, it is essential to allow for heterogeneous regression parameters for three blocs of relationships: intra-West, East-West, and intra-East. Additionally, we have to allow for changes in the respective sets of parameters over time. Here, we consider four phases since 1989, controlling for fixed exporter, importer, and time effects for the sake of consistent parameter estimates.

Over the considered time span, East-West trade grows faster in every phase than intra-West trade does, which is consistent with the early expectations. Additionally and also consistent with the hypotheses put forward in the early 90s both changing behavior and the growth in the determinants contribute to this change. A quantification of these contributions shows that the change in behavior has been much more important so far for West-East trade than the change in determinants like GDP. The opposite holds true for intra-East trade. However, the gap in key parameters between the West and the East is still large. Altogether, this new insight is in

line with the original presumptions that the fall of the iron curtain would lead partly to an immediate adjustment but would partly only show up in the medium term, after the replacement of old technologies, the necessary upgrading and replacement of production factors, and the change in the investment climate in Central and Eastern Europe.

The remainder of the paper is organized as follows. The next section outlines the adopted empirical strategy. Section 3 presents the results and quantifies the underlying contribution to East-West (intra-East) growth in trade as compared to intra-West trade. The last section concludes.

2. Design for empirical analysis of East-West and intra-East versus intra-West trade

In the empirical analysis, we stick the estimation of gravity models, where the parameters are allowed to vary between four phases of three years each (Phase1: 1989-1991, Phase 2: 1992-1994; Phase 3: 1995-1997; Phase 4: 1998-2000). We provide further details on the specification below. In general terms, the empirical model can be written as

$$Y_{ijt} = \beta_0 + X_{ij,P1}^{IW\prime}\beta_{P1}^{IW} + X_{ij,P2}^{IW\prime}\beta_{P2}^{IW} + X_{ij,P3}^{IW\prime}\beta_{P3}^{IW} + X_{ij,P4}^{IW\prime}\beta_{P4}^{IW} + X_{ij,P1}^{WE\prime}\beta_{P1}^{WE} + X_{ij,P2}^{WE\prime}\beta_{P2}^{WE} + X_{ij,P3}^{WE\prime}\beta_{P3}^{WE} + X_{ij,P4}^{WE\prime}\beta_{P4}^{WE}$$
$$+ X_{ij,P1}^{IE\prime}\beta_{P1}^{IE} + X_{ij,P2}^{IE\prime}\beta_{P2}^{IE} + X_{ij,P3}^{IE\prime}\beta_{P3}^{IE} + X_{ij,P4}^{IE\prime}\beta_{P4}^{IE} + \alpha_i + \gamma_j + \varepsilon_{ijt}$$

where Y_{ijt} denotes log real bilateral exports (in 1995 US$ or PPP, see below). $X_{ij,p}^{IW}$ is a k×1 vector of explanatory variables with phase-specific (subscript P) entries, where k is the number of block-specific regressors to determine $X_{ij,p}^{IW}$, and similarly $X_{ij,p}^{WE}$ and $X_{ij,p}^{IE}$. The superscripts IW, WE, and IE are due to intra-West, West-East (and East-West), or intra-East exports. Noteworthily, $X_{ij,p}^{IW}$ has the same entry as any traditional model would have. By way of contrast, $X_{ij,p}^{WE}$ ($X_{ij,p}^{IE}$) exhibits zero entries for all non-WE (non-IE) observations. Accordingly, the WE and IE parameters are to be interpreted as deviations from IW parameters. Hence, the WE (IE) parameters are given by the parameters of $X_{ij,p}^{WE}$ plus the parameters of $X_{ij,p}^{WE}$ ($X_{ij,p}^{IE}$). In addition to the continuous variables, k accounts for a group and phase-specific constant to capture all influences common to the respective group members in a specific phase. $\varepsilon_{ijt} \sim N(0, \sigma_\varepsilon^2)$ is a classical error term.

Recently, Anderson and van Wincoop (2003) illustrate that multilateral interdependencies should be accounted for in empirical gravity models, supporting non-linear estimation techniques. In this regard, Feenstra (2004, p. 161) makes the case for fixed country effects estimation instead. He points out that a two-way (exporter and importer) fixed effects approach is much easier to implement than the procedure suggested by Anderson and van Wincoop, and nevertheless obtains consistent estimates of the average parameters of interest. We follow this recommendation and control for fixed exporter (α_i) and importer effects (γ_j) to account for this multilateral resistance.[1] In this regard, we are well aware of the fact that Anderson and van Wincoop's as well as Feenstra's solutions to account for multilateral resistance are designed for cross-sectional data sets. However, a country's multilateral resistance is relatively time-invariant so that one can rely on their models also in panel data sets as long as the time series are not too long.

Previous theoretical research proposes two different specifications of $X_{ij,p}^{IW}$, $X_{ij,p}^{WE}$, and $X_{ij,p}^{IE}$. On the one hand, Anderson (1979), Bergstrand (1985), or Anderson and van Wincoop (2003) support a model, where bilateral exports are determined by exporter and importer size and distance (or trade frictions in a broader sense). Additionally, exporter prices and the multilateral resistance term (the price index) are relevant.

On the other hand, Helpman and Krugman (1985) and Helpman (1987) suggest another new trade theory based approach. As in the traditional Heckscher-Ohlin model, the difference in *relative* factor endowments is considered as a potentially important determinant of bilateral trade (being positively related to bilateral trade from a theoretical point of view). Additionally, *absolute* factor endowments matter in two ways. First, a rise in the similarity in absolute factor endowments is expected to increase bilateral trade (approximated by similarity in GDP as a factor-price weighted measure of absolute factor endowments). Second, an increase in absolute bilateral endowments (measured as exporter plus importer GDP) at given relative factor endowments and the similarity in absolute factor endowments should exert a positive impact on bilateral trade volumes as well. Although Helpman's (1987) focus is on a frictionless world, Helpman and Krugman (1985) indicate already that the results are qualitatively similar with trade costs.

[1] It is fair to say that Pöyhönen (1963) was the first to suggest the inclusion of fixed country effects. However, the motivation in Feenstra (2004) is different and rigorously tied to theoretical insights. In fact, these fixed effects account for all unobserved country-specific determinants.

Deardorff (1998) illustrates that both specifications are consistent with the same model. Moreover, he illustrates that a variety of classical theoretical models actually leads to a gravity-type model where exporter and importer size in terms of income matter (see also the discussion by Bergstrand, 1998).

However, in a linear cross-section model with exporter and importer fixed effects as suggested by Feenstra (2004), only parameters of variables with bilateral variation can be estimated. Country size and prices are captured by the fixed effects. This implies that the Helpman and Helpman-Krugman type specification exhibits the advantage that all corresponding marginal effects can be estimated in a model with fixed country effects. By way of contrast, the linear version of the "classical" cross-sectional model à la Anderson, Bergstrand, or Anderson and van Wincoop, only allows to estimate the impact of trade frictions (like distance, common borders, etc.). For this reason, we choose the Helpman-Krugman type specification. The corresponding variables of interest are defined as

$$SGDP_{ijt} = GDP_{it} + GDP_{jt}; \quad LSGDP_{ijt} = \ln\left(SGDP_{ijt}\right)$$

$$SIMI_{ijt} = 1 - \left(\frac{GDP_{it}}{SGDP_{ijt}}\right)^2 - \left(\frac{GDP_{it}}{SGDP_{ijt}}\right)^2; \quad LSIMI_{ijt} = \ln\left(SIMI_{ijt}\right)$$

$$RLFE_{ijt} = \left|\frac{GDP_{it}}{L_{it}} - \frac{GDP_{jt}}{L_{ij}}\right|; \quad LRLFE_{ijt} = \ln\left(RLFE_{ijt}\right)$$

where $SGDP_{+}$ is the above mentioned factor-price weighted measure of absolute bilateral factor endowments (subscripts denote the expected parameter signs), $SIMI_{+}$ is the similarity in absolute factor endowments between economies, and $RLFE_{+}$ that one in relative endowments. From its early beginning on, research on the gravity equation has pointed to the striking importance of distance as a measure of trade frictions. Whereas its inclusion was ad-hoc in early applications, the role of trade frictions in general and of distance in specific since then was studied with rigor (see Bergstrand, 1985, 1989, Hummels, 2001, Limao and Venables, 2001, Anderson and van Wincoop, 2003, 2004, for important recent contributions). Additionally, adjacency (common borders) is understood as an important determinant of bilateral trade (see Bergstrand, 1985, or Anderson and van Wincoop, 2003). The usually identified significant impact of adjacency after controlling for distance may be interpreted as indicating a non-loglinear nexus between trade frictions and distance. Accordingly and similar to Wang and Winters (1992) and Baldwin (1994) in the application to East-West trade issues, we account for log distance ($LDIST_{ij}$) and an adjacency dummy (ADJ_{ij}) as two measures of

trade frictions in the respective region-phase-specific vectors of explanatory variables. In line with previous evidence, distance (adjacency) is expected to be negatively (positively) associated with bilateral trade.

In sum, each bloc of region-phase-specific determinants contains k=6 variables, where one of them is the region-phase constant. Instead of explicitly imposing a large number of restrictions to guarantee that the fixed effects stray around the sample mean, we drop as many effects as restrictions would have to be implemented. However, this has an important consequence for the interpretation of the dummies (see Christensen, 1987, for an excellent discussion). According to the chosen design, the estimated region-phase effects refer to a specific base. In our design, we choose the average IW level of exports plus the Phase 1 EW level of exports as the common base. Even more importantly, one has to be as careful with the interpretation of the continuous variables and adjacency. As mentioned above, intra-West relationships in a particular phase reflect the "norm", whereas West-East and intra-East parameters indicate the difference from this norm. For instance an intra-West distance parameter of -1 together with a West-East parameter of -1 indicates that the distance parameter of West-East trade is -2. We have to bear this in mind for the interpretation of the regression results below.

3. Data

We use 12 years of nominal export data at f.o.b. collected in the United Nation's World Trade Database. GDP, population, export price, and PPP price deflators are taken from the World Bank's World Development Indicators.[2] We measure distance by the great-circle technique as the distance in miles between two trading partners' capitals (see Wang and Winters, 1992, and Baldwin, 1994, for a similar approach). The Appendix provides details on the country coverage.

Since the data set is unbalanced, we do not simply average observations within phases. Rather, we estimate the phase-specific effects from annual observations. This has two advantages: (i) it allows the estimation of the parameters at higher precision, and (ii) it provides an adequately weighted influence of observations, depending on their availability.[3] Table 1 summarizes the region-phase composition of the panel. Detailed descriptive statistics

[2] We only use real data in US $ of 1995 or, alternatively, in PPP.
[3] In contrast, running OLS on simply averaged data may induce a weighting bias.

for intra-West, West-East, and intra-East export flows, respectively, in each phase are provided in the Appendix.

> Table 1 <

The coverage in Table 1 illustrates that the intra-West trade-related number of observations is relatively constant across phases. By contrast, the number of covered CEECs increases, leading to a continuous rise in both related regions of trade flows. This has to do with the fact that several CEECs did not exist in the first phase (like Czech Republic or Slovak Republic) and others were founded as late as in Phase 3 (the Baltic states).

4. Estimation results

Details on the regression results regarding all region-phase specific parameter estimates are provided in Table 2.

> Table 2 <

The reported parameters are obtained after excluding observations with excess studentized residuals as recommended by Belsley et al. (1980) and they are robust to heteroskedasticity. The following general conclusions can be drawn.

First, the high adjusted R^2 figures support our specification, irrespective of whether real dollar-based or PPP-based data are used. The estimated fixed exporter and importer effects are jointly significant each, and their exclusion would obtain biased parameter estimates of the variables of interest.

Second, the reported parameter estimates support the new trade theory view that absolute factor endowments are positively related to bilateral goods trade. In line with previous research on the gravity equation, we would say that trade rises with market size. By and large, this holds true irrespective of whether we measure the variables in constant US$ or PPP. However, for intra-East trade flows the findings point to an even greater importance of Heckscher-Ohlin factors (relative factor endowments) as compared to new trade theory determinants (absolute factor endowments). As expected, distance affects trade negatively

everywhere and even more so in the CEEC (West-East and intra-East). The latter finding can be best explained by the amount and quality of transport infrastructure in the CEECs, especially in the early transition periods. Similarly, we find the expected positive impact of adjacency in all regions.

Third, the reported Wald-tests on the poolability of intra-West and West-East (intra-East) parameters indicate that the corresponding parameter vectors are significantly different. Again, ignoring the heterogeneity of the regions in this respect leads to biased parameters. Additionally, this finding also qualifies insights from recent East-West trade potential studies which – in contrast to early studies like Wang and Winters (1992) – rely on in-sample rather than out-of-sample projections of trade potentials.[4]

Fourth, the region-phase specific effects are jointly insignificant and, hence, do not contribute to the explanatory power. Put differently, the change in trade flows is less common to all countries in a particular region (intra-West, West-East, intra-East), but rather its level specific to country pairs.

> Table 3 <

Fifth and most important for our purpose, we address the question of whether the parameters of the explanatory variables are identical across phases. This and subsequent tests are summarized in Table 3. Specifically, we test $\beta_{P1} = \beta_{P2} = \beta_{P3} = \beta_{P4}$ for each variable, regional bloc, and model. A rejection of this H_0 hypothesis indicates that pooling of the parameters across phases obtains only biased parameters. Further, it points to some importance of changing elasticities for natural trade. Depending on whether parameters change mainly for intra-West or the other trade relationships, we may then explore its role for the change in natural or potential trade between the East and the West on the one hand, and within the East on the other. Irrespective of whether we use real exports measured in constant US $ or PPP, the findings indicate that the importance of new trade theory variables (size-related LGDT and LSIMI; trade-friction related LDIST and ADJ) has changed for West-East trade in the course of transition phases. The role of Heckscher-Ohlin aspects (relative factor endowment related LRFE) has changed for intra-East trade. There was neither a change in the sensitivity

[4] Including trade with the CEEC already in the regression sample and pooling the parameters. See also Egger (2001) on the problems associated with this approach, supporting the treatment as in Hamilton and Winters (1992) or in Wang and Winters (1992).

of intra-West trade with respect the included variables, nor have the intra-East elasticity of trade with respect to new trade theory factors changed.

However, it is obvious from a closer look at the change of West-East parameters in Table 2 that a lot of variation is due to Phase 2, probably due to the transition recession at that time. Excluding Phase 2 an testing $\beta_{P1} = \beta_{P3} = \beta_{P4}$, we find that parameter homogeneity in West-East trade is only rejected for distance. Note again that the overall impact of each variable for West-East trade is captured by the intra-West plus the West-East parameter.

However, so far we only have obtained a broad picture about parameter heterogeneity versus homogeneity within region-specific trade. A more detailed picture can be obtained from assessing the phase-specific changes in parameters in West-East (or intra-East) trade. Specifically, we have to test $|\beta_{Pt}| \leq |\beta_{Pu}|$ for t,u=1,…,4 and t<u. This is nothing else than a test of whether West-East or intra-East trade change towards western "normal" trade in terms of their elasiticites with respect to the determinants. For instance, we see from Model ? in Table 2 that the distance parameter of West-East trade (i.e. the difference to intra-West trade) falls from about -1.17 in Phase 1 to -0.72 in Phase 4. If the difference in these two parameters in absolute terms falls, the we may say that West-East has come closer to "normality" in the course of phases. Indeed this is the case, and we find that the major change has occurred from Phase 1 to Phase 3, whereas the change was much flatter between Phase 3 and Phase 4.

5. Decomposing bloc-specific growth of trade: changing behavior versus determinants

Finally, we can proceed to decompose phase-to-phase bilateral export growth into the contribution by the change in explanatory variables and that one in parameters. Regarding the former, it is clear that neither distance nor border can have an effect here, by definition. With respect to the latter it again has to be accounted for the fact that the overall parameter change for West-East (intra-East) trade consists of the corresponding intra-West plus the West-East (intra-East) change. Formally, the decomposition of predicted growth of bilateral exports from Phase t to Phase u reads

$$\Delta\hat{Y}_{ij} = \underbrace{\Delta\mathbf{X}_{ij}'\hat{\boldsymbol{\beta}}_{Pt}}_{\text{variable change effect}} + \underbrace{\underbrace{\mathbf{X}_{ij,Pu}'\Delta\hat{\boldsymbol{\beta}}^{IW}}_{\text{norm change effect}} + \underbrace{\mathbf{X}_{ij,Pu}'\Delta\hat{\boldsymbol{\beta}}^{WE}}_{\text{parameter transition effect}}}_{\text{total parameter change effect}}$$

Intra-East trade can decomposed in the same way. This type of decomposition is attributed to Blinder (1973) and Oaxaca (1973), and we apply it for the first time to pan-European bilateral trade. Table 4 summarizes our findings for the decomposition of export growth measured in constant PPP.

> Table 4 <

The table consists of two blocks in the vertical dimension. In the upper block, we report the variable-specific contribution to growth of exports due to the change in variables rather than parameters for each block of country-pairs (intra-West, West-East, intra-East). In the lower block, we display the effect of the change in parameters. For the latter, we distinguish between the total parameter (or behavior) change effect and – in case of East-West or Intra-East trade – the change in East-West or intra-East behavior relative to the EU. Table 4 also distinguishes between two blocks of results in the horizontal dimension. The results on the left hand side refer to the change between the first transition phase and the last one covered by our data set. Due to missing observations, we cannot derive the associated results for intra-East trade. Accordingly, we report a similar set of results based on growth of trade between the second and the last transition phase. Throughout, significant contributions to export growth appear in bold face.

We first explore the sources of export growth between the first and the last transition phase. The first column of results in Table 4 suggests that growth of intra-West trade was entirely driven by changes in variables rather than parameters (or behavior). Hence, we might conclude from this that the estimated export behavior is indeed in the steady-state for this sub-set of country-pairs. This can be seen from the overwhelming contribution of changes in variables to export growth and from the fact that the contribution of all parameter changes together was insignificant. Moreover, it turns that the change in intra-West trade was almost entirely driven by total and relative country size. This lends strong support to the view expressed in Brenton and Gros (1997) that in the steady-state the related "growth of trade will be primarily determined by the development of income". Interestingly, the results for West-East trade are different. First, the change in West-East trade between the first and the last transition phase was mainly by changing behavior rather than variables. Changing relative factor endowments were important besides changing income (country size) to explain West-East trade. Among changing behavioral relationships the elasticities of trade with respect to

geographical determinants (distance and adjacency) have significantly contributed to the change in West-East trade. Hence, between the first and the last transition phase we observe a significant convergence in the parameters of the two geographical variables between intra-West and West-East relationships (see the phase-specific coefficients in Table 2 and the corresponding bold West-East contribution figures in the lower block of Table 4). The phase-specific intra-West and West-East parameters in Table 2 mostly differ in terms of the export sensitivity with respect to geographical determinants (distance). However, the corresponding differences are about to deteriorate as the transition process moves on. This finding supports Gros and Gonciarz' (1996, p. 720-721) conclusion that "the trade patterns which emerged quickly after CEE economies liberalized their trade with the West might be fairly indicative of the trade patterns in the near future. In the short run it was a matter of redirecting their capacities to selling on Western markets. In the longer run, however, the scope for increased export growth to EU markets depends on whether a catching-up process will take place in the different CEE countries and this depends upon factors which facilitate the process of industrial restructuring."

As indicated above, because of lacking observations a similar inference is impossible for intra-East trade when comparing the first and the last transition phase. However, a comparison of the second and the last transition phase is possible. According to the results on the right hand side of Table 4, our earlier conclusions for intra-West and West-East trade are valid for these two phases in general terms. The only difference is that also changes in the parameters for economic size and relative factor endowments were important between the second and the last phase. Hence, the transition recession between the first and the second phase has obviously affected the way how West-East trade has responded to changes in economic size and relative factor endowments (see also Baldwin, 1997, on this issue). As indicated by the parameter estimates in the right block of results in Table 2, there was a significant difference between all intra-West and intra-East parameters in the average transition phase, except for adjacency. However, except for relative factor endowments this difference did not deteriorate during the transition process in the 1990s at usual levels of significance (see the bold figures in the lower block of results in Table 4). Even more so than intra-West trade, the change in intra-East trade volumes must mainly be attributed to changes in economic size and factor endowments rather than economic behavior. The latter establishes a crucial difference in the sources of growing trade intra-block and inter-block trade of Western and Eastern Europe in the 1990s. According to our estimation results, West-East trade and intra-West trade respond

already very similarly to changes in economic determinants. We would therefore conclude that changes in income and economic size will be the main engines of intra-West and West-East trade. However, in the medium to long term we would expect that a convergence of economic behavior to Western European standards will be an additional important source of the growth of trade within Eastern Europe.

5. Conclusions

In the early 1990s, Carl Hamilton and Alan Winters, Zhen-Kun Wang and Alan Winters, and Richard Baldwin have prominently made the case for an eastern enlargement of the European Union. Besides the political reasons for doing so, they provided an economic rationale based on an insight that has stimulated a whole branch of subsequent research. Their finding was that East-West trade strongly deviated from what we would have concluded to be "normal", regarding traditional elasticity estimates for trade with respect to economic size and geographical proximity. They convincingly argued that the opening up of Eastern Europe and the adoption of market-oriented rules to organize the economy should lead to a tremendous increase in trade between the West and the East.

After much more than a decade, a re-evaluation of the transition process following the fall of the iron curtain seems in order. Rather than starting out to "test" the appropriateness of one or the other prediction of the founders of this literature, it was this paper's purpose to shed light on the actual causes of the West-East but also the intra-East (and the intra-West) growth of bilateral trade from the early transition phases on. In this way, the findings are able to complement the earlier insights. We can now answer several important questions about the change in economic behavior associated with the transition process and reflected in different trade elasticities. For instance, we are able to shed light on how different West-East and intra-West trade elasticities were in the early stage of the transition process, and how fast they are adjusting. Further, we investigate whether the change in economic size (and relative factor endowments) versus the change in economic behavior (i.e., trade elasticities) were the main driving forces in West-East trade in the 1990s, and how West-East trade differs from intra-East trade in this regard. This seems especially important for what we should expect from the near future for the pace of the growth of trade in Western and Eastern Europe.

Our findings indicate that West-East trade and intra-East trade exhibit different characteristics. Economic behavior has adjusted rapidly for West-East trade. One reason for this may be the role played by multinational firms. In contrast to intra-West trade, where the

business cycle determines the growth of bilateral trade, changing economic behavior determined West-East growth in the early transition phases. By way of contrast, intra-East trade was mainly driven by economic determinants such as intra-West trade. However, besides market size and the business cycle, specialization associated with relative factor endowment differences was important there.

From our regression results, we expect economic behavior (trade elasticities) in the East to only slowly approach Western levels. This means that West-East trade and intra-East trade will react more sensitively to the business cycle and changes in market size in the medium run. To some extent, this renders the conclusions from more recent analyses of West-East trade potentials problematic. Our estimates point to a dynamic growth of West-East trade also for the medium run. There is no indication that this process has come to an end.

One important finding was that West-East and, especially, intra-West trade is significantly more sensitive to distance and trade costs. In this regard, that any reduction in trade costs is about twice as "productive" for West-East trade than for intra-West trade. The role played for intra-East trade is even more important. Improvements of the infrastructure are most likely eager to reduce these trade frictions. Accordingly, the importance of the European Union's Structure and Cohesion Funds for financing infrastructure investments should not be underestimated for stimulating trade between the West and the East but also within the East.

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Appendix 1: Country sample

In the empirical analysis, we consider real bilateral export flows between the following 34 economies:

Western Europe: Austria, Belgium, Denmark, Finland, France, Germany, Great Britain, Greece, Ireland, Island, Italy, Lichtenstein, Luxemburg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland.

Eastern Europe: Bosnia-Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Serbia and Montenegro (FR Yugoslavia), Slovakia, Slovenia, TFYR Macedonia, Ukraine.

Appendix 2: Descriptive statistics

> Table A1 <

Table 1: Data Coverage by Regions and Phases

	Intra-West	West-East[a)]	Intra-East
Phase 1: 1989-1991	815	235	dropped
Phase 2: 1992-1994	815	948	225
Phase 3: 1995-1997	800	1375	508
Phase 4: 1998-2000	877	1456	530
Total	3307	4014	1263

a) Defined as West-East and East-West export flows.

Table 2: Regression Results for Real Bilateral Exports in Constant US$ or PPP

		In constant US $ (1995)			In PPP (1995)		
Explanatory variables	Phase	Intra-West	West-East	Intra-East	Intra-West	West-East	Intra-East
LGDT	1	1.727 ***	0.106	-	1.305 ***	0.308 ***	-
= $\ln(GDP_i+GDP_j)$		(9.74)	(1.03)	-	(8.51)	(3.87)	-
	2	1.697 ***	0.415 ***	0.034	1.300 ***	0.531 ***	0.491 ***
		(9.56)	(6.65)	(0.27)	(8.50)	(11.09)	(5.26)
	3	1.730 ***	0.170 ***	-0.152	1.320 ***	0.353 ***	0.414 ***
		(9.58)	(2.75)	-(1.36)	(8.49)	(7.52)	(5.16)
	4	1.718 ***	0.199 ***	-0.095	1.312 ***	0.401 ***	0.387 ***
		(9.36)	(3.26)	-(0.84)	(8.33)	(8.85)	(4.79)
LSIMI	1	0.790 ***	-0.156	-	0.683 ***	0.051	-
= $\ln\{1-[GDP_i/(GDP_i+GDP_j)]^2-[GDP_j/(GDP_i+GDP_j)]^2\}$		(8.55)	-(1.38)	-	(8.31)	(0.48)	-
	2	0.796 ***	0.206 ***	0.112	0.700 ***	0.296 ***	0.173 #
		(8.60)	(3.28)	(0.83)	(8.56)	(5.85)	(1.53)
	3	0.830 ***	0.032	-0.039	0.727 ***	0.164 ***	0.265 ***
		(8.86)	(0.51)	-(0.40)	(8.78)	(3.35)	(3.04)
	4	0.807 ***	0.046	-0.045	0.697 ***	0.201 ***	0.185 **
		(8.63)	(0.76)	-(0.44)	(8.43)	(4.20)	(2.02)
LRFE	1	0.019	0.063	-	0.025	0.102	-
= $\ln\|GDP_i/L_i - GDP_j/L_j\|$		(0.77)	(0.57)	-	(1.10)	(1.04)	-
	2	0.040 #	-0.133 **	0.067	0.035	-0.139 **	0.178 ***
		(1.63)	-(2.19)	(1.20)	(1.37)	-(2.44)	(3.88)
	3	0.014	-0.013	0.204 ***	-0.007	0.006	0.223 ***
		(0.54)	-(0.24)	(5.02)	-(0.27)	(0.14)	(5.78)
	4	0.010	0.009	0.200 ***	0.016	0.014	0.455 ***
		(0.45)	(0.17)	(5.94)	(0.70)	(0.31)	(9.62)
LDIST	1	-0.876 ***	-1.379 ***	-	-0.841 ***	-1.401 ***	-
= ln distance between i and j		-(14.22)	-(8.86)	-	-(14.91)	-(10.15)	-
	2	-0.871 ***	-1.164 ***	-1.643 ***	-0.831 ***	-1.234 ***	-1.592 ***
		-(14.10)	-(13.45)	-(12.51)	-(14.81)	-(16.02)	-(12.91)
	3	-0.828 ***	-0.933 ***	-1.808 ***	-0.808 ***	-0.912 ***	-1.569 ***
		-(12.90)	-(11.63)	-(18.02)	-(14.21)	-(12.84)	-(16.09)
	4	-0.839 ***	-0.905 ***	-1.780 ***	-0.823 ***	-0.850 ***	-1.529 ***
		-(14.70)	-(12.39)	-(18.77)	-(15.77)	-(12.86)	-(16.16)
ADJ	1	0.452 ***	-0.505 #	-	0.454 ***	-0.551 *	-
= common border dummy		(4.53)	-(1.52)	-	(4.88)	-(1.80)	-
	2	0.448 ***	-0.250	-0.217	0.443 ***	-0.242 #	-0.194
		(4.51)	-(1.39)	-(1.15)	(4.77)	-(1.45)	-(1.09)
	3	0.460 ***	0.027	-0.055	0.415 ***	0.116	-0.180
		(4.58)	(0.16)	-(0.36)	(4.46)	(0.76)	-(1.20)
	4	0.505 ***	-0.011	-0.165	0.488 ***	0.087	-0.158
		(5.28)	-(0.07)	-(1.14)	(5.45)	(0.58)	-(1.07)
Number of observations			8225			7768	
Number of country-pairs			961			870	
Number of exporters (xdf)			30			29	
Number of importers (mdf)			31			29	
Adjusted R^2			0.925			0.922	
RMSE			0.749			0.701	
Model degrees of freedom (edf)			125			122	
Residual degrees of freedom (rdf)			8099			7645	
Panel effects:							
Exporter: F(xdf,rdf)			67.25 ***			71.631 ***	
Importer: F(mdf,rdf)			40.09 ***			37.053 ***	
Parameter poolability:							
β_{LGDT} identical to Intra-West across phases		-	11.13 ***	1.25	-	45.17 ***	14.37 ***
β_{LSIMI} identical to Intra-West across phases		-	4.24 ***	0.41	-	10.42 ***	4.40 ***
β_{LRFE} identical to Intra-West across phases		-	1.42	19.32 ***	-	2.08 *	43.42 ***
β_{LDIST} identical to Intra-West across phases		-	104.38 ***	242.68 ***	-	135.05 ***	200.89 ***
β_{ADJ} identical to Intra-West across phases		-	1.06	0.88	-	1.57	1.18
Constant identical to Intra-West across phases		-	1.67	0.88	-	0.95	0.24
All parameters identical to Intra-West acr. phases		-	35.17 ***	61.25 ***	-	57.71 ***	60.42 ***

Significance levels of t-tailed t-tests: *** significant at 1%; ** significant at 5%; * significant at 1%; # significant at 15%.

Table 3: Parameter Homogeneity Across Phases

			Intra-West			West-East			Intra-East	
	H_0 hypothesis	Phase\Phase	2	3	4	2	3	4	3	4
LGDT	$\lvert\beta_{Pt}\rvert<\lvert\beta_{Pu}\rvert$	1	0.46	0.63	0.56	0.99	0.69	0.85		
= $\ln(GDP_i+GDP_j)$	$\lvert\beta_{Pt}\rvert<\lvert\beta_{Pu}\rvert$	2		0.67	0.60		**0.00**	**0.01**	0.21	0.14
	$\lvert\beta_{Pt}\rvert<\lvert\beta_{Pu}\rvert$	3			0.42			0.81		0.37
	$\beta_{P1}=\beta_{P2}=\beta_{P3}=\beta_{P4}$			0.97			**0.01**		0.56	
	$\beta_{P1}=\beta_{P3}=\beta_{P4}$			0.94			0.48		0.74	
LSIMI	$\lvert\beta_{Pt}\rvert<\lvert\beta_{Pu}\rvert$	1	0.65	0.84	0.63	0.98	0.84	0.91		
= $\ln\{1-[GDP_i/(GDP_i+GDP_j)]^2-[GDP_j/(GDP_i+GDP_j)]^2\}$	$\lvert\beta_{Pt}\rvert<\lvert\beta_{Pu}\rvert$	2		0.73	0.47		**0.01**	0.05	0.75	0.53
	$\lvert\beta_{Pt}\rvert<\lvert\beta_{Pu}\rvert$	3			0.24			0.75		0.25
	$\beta_{P1}=\beta_{P2}=\beta_{P3}=\beta_{P4}$			0.80			**0.05**		0.72	
	$\beta_{P1}=\beta_{P3}=\beta_{P4}$			0.60			0.39		0.50	
LRFE	$\lvert\beta_{Pt}\rvert<\lvert\beta_{Pu}\rvert$	1	0.62	0.30	0.38	0.62	0.18	0.20		
= $\ln\lvert GDP_i/L_i - GDP_j/L_j\rvert$	$\lvert\beta_{Pt}\rvert<\lvert\beta_{Pu}\rvert$	2		0.22	0.28		**0.05**	**0.06**	0.78	1.00
	$\lvert\beta_{Pt}\rvert<\lvert\beta_{Pu}\rvert$	3			0.60			0.56		1.00
	$\beta_{P1}=\beta_{P2}=\beta_{P3}=\beta_{P4}$			0.67			**0.04**		**0.00**	
	$\beta_{P1}=\beta_{P3}=\beta_{P4}$			0.62			0.65		**0.00**	
LDIST	$\lvert\beta_{Pt}\rvert<\lvert\beta_{Pu}\rvert$	1	0.45	0.33	0.40	0.14	**0.00**	**0.00**		
= ln distance between i and j	$\lvert\beta_{Pt}\rvert<\lvert\beta_{Pu}\rvert$	2		0.38	0.46		**0.00**	**0.00**	0.44	0.34
	$\lvert\beta_{Pt}\rvert<\lvert\beta_{Pu}\rvert$	3			0.59			0.25		0.38
	$\beta_{P1}=\beta_{P2}=\beta_{P3}=\beta_{P4}$			0.98			**0.00**		0.91	
	$\beta_{P1}=\beta_{P3}=\beta_{P4}$			0.91			**0.00**		0.76	
ADJ	$\lvert\beta_{Pt}\rvert<\lvert\beta_{Pu}\rvert$	1	0.47	0.38	0.61	0.19	**0.10**	**0.09**		
= common border dummy	$\lvert\beta_{Pt}\rvert<\lvert\beta_{Pu}\rvert$	2		0.41	0.64		0.29	0.25	0.47	0.44
	$\lvert\beta_{Pt}\rvert<\lvert\beta_{Pu}\rvert$	3			0.72			0.45		0.46
	$\beta_{P1}=\beta_{P2}=\beta_{P3}=\beta_{P4}$			0.95			0.11		0.99	
	$\beta_{P1}=\beta_{P3}=\beta_{P4}$			0.84			0.13		0.92	

Bold figures indicate that test statistics are significant at least at the 10% level.

Table 4: Decomposition of Export Growth by Region (Data in PPP)

	Phase 1 to Phase 4		Phase 2 to Phase 4		
	Intra-West	West-East	Intra-West	West-East	Intra-East
Contribution of Variable Change in Percent					
LGDT = $\ln(GDP_i+GDP_j)$	**85.71**	**45.22**	**65.91**	**36.40**	**54.58**
LSIMI = $\ln\{1-[GDP_i/(GDP_i+GDP_j)]^2-[GDP_i/(GDP_i+GDP_j)]^2\}$	**4.21**	**-11.06**	**5.50**	**-1.93**	**9.32**
LRFE = $\ln\lvert GDP_i/L_i - GDP_j/L_j\rvert$	0.31	**1.36**	-0.14	**0.73**	**35.70**
All Variables	**90.23**	**35.51**	**71.27**	**35.19**	**99.60**
Contribution of Parameter Change in Percent					
LGDT = $\ln(GDP_i+GDP_j)$	37.25	291.43	69.52	**-385.79**	-348.54
of this: difference in West-East (Intra-East) to Intra-West		19.81		**36.61**	41.96
LSIMI = $\ln\{1-[GDP_i/(GDP_i+GDP_j)]^2-[GDP_i/(GDP_i+GDP_j)]^2\}$	-4.05	-21.55	1.12	**18.35**	-1.55
of this: difference in West-East (Intra-East) to Intra-West		-1.83		0.66	0.66
LRFE = $\ln\lvert GDP_i/L_i - GDP_j/L_j\rvert$	-15.05	-97.84	-35.85	**151.40**	**290.69**
of this: difference in West-East (Intra-East) to Intra-West		-9.54		**-22.27**	**-22.21**
LDIST = ln distance between i and j	23.26	**420.02**	12.05	**317.84**	64.99
of this: difference in West-East (Intra-East) to Intra-West		**12.70**		**6.41**	7.23
ADJ = common border dummy	0.47	**1.96**	0.24	**1.75**	0.10
of this: difference in West-East (Intra-East) to Intra-West		**0.06**		0.04	0.01
Phase-Effects	-32.12	**-529.54**	-18.35	-38.74	-5.29
of this: difference in West-East (Intra-East) to Intra-West		-17.31		-9.80	-11.67
All Parameters	9.77	**64.49**	28.73	**64.81**	**0.40**

Bold figures indicate significant contributions at the 10% level of two-tailed t-tests.

Table A1: Descriptive Statistics by Phase and Country Block

Variable	Phase	Intra-West			West-East			Intra-East		
		N	Mean	Std. dev.	N	Mean	Std. dev.	N	Mean	Std. dev.
Log real exports in U.S. $	1	767	7.04	1.97	246	4.19	2.08	-	-	-
	2	771	7.00	2.00	913	3.95	2.37	212	3.98	2.26
	3	768	7.21	2.00	1194	4.50	2.13	400	3.94	2.39
	4	833	7.21	2.09	1251	4.76	2.20	413	4.09	2.37
Log real exports in PPP	1	767	6.77	1.95	246	4.10	2.07	-	-	-
	2	771	6.81	1.97	913	3.81	2.33	212	3.22	2.23
	3	768	7.07	1.98	1194	4.19	2.13	400	3.08	2.38
	4	833	7.08	2.06	1251	4.42	2.22	413	3.20	2.38
LGDT = $\ln(GDP_i+GDP_j)$	1	767	27.01	0.90	246	26.63	0.79	-	-	-
	2	771	27.10	0.91	913	26.53	0.96	212	25.62	0.74
	3	768	27.23	0.90	1194	26.60	0.98	400	25.53	0.78
	4	833	27.27	0.93	1251	26.64	1.01	413	25.59	0.77
LSIMI = $\ln\{1-[GDP_i/(GDP_i+GDP_j)]^2-[GDP_i/(GDP_i+GDP_j)]^2\}$	1	767	-1.43	0.87	246	-1.15	0.57	-	-	-
	2	771	-1.43	0.88	913	-1.64	0.95	212	-1.22	0.52
	3	768	-1.41	0.87	1194	-1.74	1.00	400	-1.25	0.55
	4	833	-1.45	0.89	1251	-1.70	0.96	413	-1.20	0.52
LRFE = $\ln\lvert GDP_i/L_i - GDP_j/L_j\rvert$	1	767	7.81	1.20	246	9.16	0.51	-	-	-
	2	771	7.95	1.05	913	9.29	0.54	212	7.44	1.32
	3	768	7.96	1.07	1194	9.38	0.65	400	7.73	1.26
	4	833	8.11	1.24	1251	9.53	0.60	413	8.01	0.90
LDIST = ln distance between i and j	1	767	6.67	0.63	246	6.84	0.46	-	-	-
	2	771	6.67	0.63	913	6.72	0.52	212	6.09	0.59
	3	768	6.67	0.63	1194	6.72	0.55	400	6.14	0.61
	4	833	6.64	0.66	1251	6.72	0.55	413	6.15	0.60
ADJ = common border dummy	1	767	0.13	0.34	246	0.03	0.18	-	-	-
	2	771	0.13	0.33	913	0.04	0.18	212	0.26	0.44
	3	768	0.13	0.34	1194	0.03	0.18	400	0.22	0.41
	4	833	0.13	0.34	1251	0.03	0.18	413	0.21	0.41