

Trade Flows in the Former Soviet Union, 1987-1996¹

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Abstract

The effects of past linkages on trade flows in the former Soviet Union (FSU) are studied using a gravity equation, estimated from trade flows among and between nine Russian regions and fourteen FSU republics from 1987 to 1996. We find that Russian regions traded sixty percent more with each other than with republics in the period from 1994 to 1996. In contrast, these regions did not trade significantly more with each other than with republics in the period from 1987 to 1990. We find that past linkages, such as infrastructure, production and consumption chains, and business networks, have limited the reorientation of trade.

Introduction: Why Do Borders Matter?

Have trade patterns in the former Soviet republics and the Russian regions changed significantly after the collapse of the Soviet Union? Theory implies that, with the erection of trade barriers, trade of the Russian regions will be reoriented toward each other at the expense of trade with the former republics. Furthermore, the share of trade within the former Soviet Union (FSU) will shrink, while trade with non-FSU countries will expand. In this paper, we examine how trade patterns in the FSU have changed following its disintegration.

The paper offers three contributions. First, we document the adjustment in trade flows in response to the collapse of the FSU. We find that trade intensity in the FSU remained high in the years immediately following the break-up of the Soviet Union. We examine bilateral trade flows among nine Russian regions and fourteen republics of the FSU before and after the union dissolved. Estimating a gravity equation, we find that Russian regions did not trade more with each other than with other Soviet republics in the pre-reform period. However, in the reform period Russian regions traded about sixty percent more with each other than with the republics, and this domestic bias increased over time. Thus, the disintegration of the Soviet Union has already led to a significant domestic reorientation in trade. However, the estimated domestic bias in Russia is still far lower than the domestic bias found in studies of OECD countries. We also find that the elasticities of trade to income and distance in the pre-reform period are markedly smaller than those typically found in empirical work using the gravity equation. However, in the reform period the elasticities are similar to those from studies of other countries. The

decline of central planning has allowed gravity to set in so that income and distance influence trade flows in a more standard way in the FSU.

Second, the evidence suggests that the slow adjustment of production and of infrastructure has limited trade reorientation in the Russian regions away from the former Soviet republics. Using past trade to proxy for linkages developed when the Soviet Union was integrated, we find that past linkages influence current trade significantly. Since past trade was centrally planned, it is unlikely that we are picking up other unobserved persistent variables, such as tastes or comparative advantage. As linkages with other republics continue to atrophy, the domestic trade bias will increase to well over the sixty percent that we estimate for 1996, which is the last year with available trade data. Indeed, linkages with some republics have deteriorated already because of local conflicts. For example, Russian regions traded eight times more with each other than with Georgia in 1996, largely because the Chechen war disrupted standard trade routes. In contrast, Russian regions did not trade significantly more with each other than with Belarus and Kazakhstan, two countries that have maintained strong ties with Russia.

Finally, the paper adds to the existing literature on trade reorientation in the former socialist bloc. This literature shows very high initial trade intensities in the waning year of central planning and a slow and non-monotone reduction in these intensities led by a shift towards trade with Western Europe. In the most comprehensive study of trade reorientation in transition economies, Fidrmuc and Fidrmuc (2000) show that, at the time of the disintegrations of Czechoslovakia, the Soviet Union, and Yugoslavia, intra-union trade exceeded normal trade by approximately forty-three times in the former two cases and by twenty-four times in Yugoslavia. By 1998, trade exceeded normal trade seven

times in the former Czechoslovakia, thirteen times in the Baltics, and thirty times for Belarus, Russia, and Ukraine. The observed reduction in trade intensity between the former Soviet republics was slow, with the exception of trade between the three Baltic republics and the Central Asian republics. Maurel and Chiekbossian (1998) estimate that trade between the members of the Council for Mutual Economic Assistance (CMEA) was thirteen times higher than it should have been in the absence of the trade zone in 1990. This bias declined rapidly following the collapse of the CMEA, reaching five by 1992 and four by 1993. The major explanation for this collapse is the diminished trade between the FSU and the former socialist economies in Central and Eastern Europe.

The study closest to ours is Havrylyshyn and Al-Atrash (1998), who document the movement in export shares among the former Soviet republics from 1990 to 1996. They show that trade in the FSU was highly concentrated; with the exception of Russia, the share of inter-republic trade in each FSU country exceeded eighty percent in 1990. By 1996, more than half of the exports from Estonia, Latvia, and Tajikistan went to non-FSU countries. Russia directed about two-thirds of its exports outside the FSU in 1990 and almost four-fifths by 1996. In related work, Havrylyshyn (1994) argues that the collapse of intra-FSU trade should not be interrupted with the creation of regional trade zone. Instead, the FSU countries should favor gradual multilateral liberalization following the policies taken by the Czech Republic, Hungary, and Poland in the early 1990s.

Borders seem to matter since empirical studies on the effects of economic integration are uniform in finding a high domestic bias in trade. Using inter-provincial and province-state trade data, McCallum (1995) finds that Canadian provinces traded

about twenty times more among themselves than with U.S. states in 1990. More recently, Helliwell (1999) estimates the bias to be twelve in 1996 following the free trading agreement between the two countries.² Wei (1996) and Helliwell (1999) estimate that the domestic trade bias among OECD countries ranges from three to twelve.³

It remains a puzzle as to why political borders matter so much. Three hypotheses have been put forward in the literature: international trade barriers, natural partners, and historical linkages. The first implies that borders matter because of tariffs, quotas, and other barriers to trade. Trade barriers raise the relative price of imported goods and lead to a consumption bundle biased towards domestically produced goods. Alternatively, borders may be endogenous. Owing to comparative advantage, tastes, or technology, regions within a border may simply be natural trade partners. Borders tend to be formed around populations that are relatively homogeneous, have similar tastes, and in which the regional economies are linked. These associated regions may create borders to protect themselves from external shocks.

Finally, cross-border trade may be relatively small because past isolation has led to domestically oriented infrastructure and production. For example, highways, rail systems, legal and regulatory institutions, business networks and consumer networks, and telecommunications systems all differ across countries. These differences increase the costs of international trade relative to domestic trade. Since infrastructure adjusts slowly, a history of isolation will depress trade and historical linkages to other nations will promote current trade. Similarly, if capital adjustment across industries is costly, an economy with primarily domestically oriented industry will adjust slowly to external pressure.

A growing empirical literature finds that historical linkages are important determinants of trade. Frankel, Stein and Wei (1995) show that countries with colonial links and countries with common language trade more with each other than the gravity model would predict. Frankel (1997) surveys the literature on the dissolution of British and French colonial links and the breakup of federations, e.g., the Austro-Hungarian Empire, the Malay Federation, Czechoslovakia, and the former Soviet Union, and finds “a tendency for established bilateral trade ties to change relatively slowly” (p.126). However, he notes the tenuous nature of these findings derived from trade intensity ratios, which do not control for the effects of distance and income. Eichengreen and Irwin (1996) find that lagged bilateral trade is significant in determining current bilateral trade in a large cross-section of countries, after controlling for income and distance, and interpret this as evidence that past linkages adjust only slowly to new conditions. Also indicative of the importance of historical linkages, Freund (2000) finds that the founding members of the European Union first created a well-integrated market among themselves and then maintained stronger trade links with each other than with countries that joined later. There is no evidence of a bias in trade towards the original members before the common market was formed.

2. Empirical Specification

The disintegration of the Soviet Union provides a unique case study because, in the pre-reform period, there were no trade barriers and trade was centrally planned. In the reform period, borders have been erected, large tariffs have been put in place, and central planning has been abandoned; but, transport costs and infrastructure are slow to change.

This allows us to examine how past integration affects current trade, when there are no differences in infrastructure and history. Hence, any correlation between pre-reform trade and current trade, after controlling for size and distance, must be largely a result of historical linkages and not the result of unobservables such as comparative advantage and tastes.

2.1 The Data

We examine trade among nine regions in Russia (North, Northwest, Central, Central Chernozym, North Caucasus, Volga, Volga-Vyatka, Ural, and the Far East region) and fourteen former republics of the Soviet Union (Armenia, Azerbaijan, Belarus, Estonia, Georgia, Kazakhstan, the Kyrgyz Republic, Lithuania, Latvia, Moldova, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan) before and after disintegration. Data on aggregate inter-regional and inter-republican trade flows in the Soviet Union were collected consistently by the Soviet Union's State Statistics Committee starting in 1964. After the collapse of the Soviet Union in 1992, the Russian State Statistics Committee (Goskomstat) continued the collection and publication of inter-republican trade flow data (Goskmostat, 1997). Inter-regional data on net trade flows for Russia are published also by Gomskomstat (1993, 1998).

Trade data are available for 1987 to 1990, and from 1993 to 1996. We exclude 1993 from the analysis because forty percent of the observations were missing and trade flows were reported only in each former republic's newly introduced currency, which made conversion to US dollars difficult. The 1987 to 1990 data are reported in Russian rubles and converted into US dollars using the black market exchange rate for 1990, in which one ruble equaled 0.38\$U.S., as reported in World Bank (1992). The 1994 to 1996

data are reported in U.S. dollars. Two Russian regions, namely East and West Siberia, are excluded from the dataset because of too many missing values in the 1994 to 1996 period.

There are three weaknesses in the trade data. First, because of central planning, the pre-reform trade values are not market values. The collapse of central planning brought about significant relative price changes; the prices of soft goods plummeted, while the prices of hard goods increased. Since Russia is relative well-endowed with hard exportables, e.g., oil and gas, metals, timber, some of the decline of trade with the other former republics is likely to be due to valuation.

The second problem is the presence of barter trade, which became quite common in the FSU in the reform period. Barter transactions are recorded in a special section of the customs declarations for cross-border trade and supplier invoices for intra-Russian trade. Suppliers are required to price their merchandise at the prevailing market price in the country of origin plus a price premium as a penalty for non-cash payment. The price premia are included in the invoice. However, the prices at which barter trade is recorded are likely to be biased downwards in order to avoid taxes. The incentive is stronger in cross-border transactions since consignments are levied with customs duties.

The third problem is the level of aggregation of the trade data, which is available only for regions and former republics. Parts of five regions in the sample, Central, Central Chernozym, North Caucasus, Volga, and Volga-Vyatka, are contained in Russia's 1996 Red Belt. Regions within the Red Belt voted against Yeltsin in the 1996 federal elections and favored instead the Communist Party candidate Gennady Zhyuganov. As shown in Berkowitz and DeJong (1999), this voting behavior reflected

major economic policy differences. Red Belt regions used more price controls and distortionary subsidies to enterprises and frequently hindered trade with non-Red Belt regions, thus forming an internal border. These differences are difficult to account properly for in the data. For example, among the five sub-regions within Volga-Vyatka, three, Chuvash, Mariy El, and Mordovia, were in the Red Belt but two, Kirov and Nizhny Novgorod, were not. In the next section, we control for the possibility that the Red Belt influences our results.

The GDP data for republics come from World Bank (1993, 1994, 1997). As in the trade data, 1987 to 1990 values are reported in Russian rubles and converted to US dollars using the 1990 black market exchange rate. The 1994 to 1996 numbers are reported in both local currencies and US dollars. We use Goskomstat (1993, 1998) to complement our republican data with data for the nine Russian regions.

The income data display significant changes over the sample period, with a precipitous initial drop and a subsequent steady increase in the reform period. In contrast, the pre-reform period was marked by stagnant income growth. By 1996, four republics, Estonia, Kazakhstan, Latvia, and Lithuania, and five Russian regions, North, Northwest, Central, Volga, and Ural, had reached GDP levels higher than in 1987 in dollar terms. At the opposite extreme, Armenia, Azerbaijan, Moldova, and Tajikistan fell to half of their 1987 levels by 1996.

We use the road travel guide (Ministerstvo Transporta SSSR, 1990) to construct a distance matrix. Distance is measured in kilometers and covers the shortest distance between two regional or republican centers. This measure is superior to air distance since it accounts for the level of development of Soviet infrastructure. The longest distance

between two economic centers is the 9,687 kilometers from Latvia to the Far East region of Russia. We use the following Russian regional capitals to calculate the distance matrix: Murmansk (North region), St. Petersburg (Northwest region), Moscow (Central region), Voronezh (Central Chernozym region), Postov (North Caucasus region), Samara (Volga region), Nizhny Novgorod (Volga-Vyatka region), Sverdlovsk (Ural), and Petropavlovsk (Far East region).⁴ We use the newly independent republics' capital cities as the main trade centers.

Figure 1 shows each country's share of total exports that go to other FSU countries in 1990 and 1996. FSU export shares have declined for all of the former members. The most significant reorientation away from FSU markets took place in Armenia and Latvia. This suggests that a significant reorientation of trade away from FSU countries has occurred since the disintegration of the FSU.

[Figure 1 here]

However, our interest lies primarily in the domestic reorientation of trade within Russia so that we also document the share of total FSU trade with Russia for each region and each republic. In the pre-reform period, on average sixty-five percent of each region's trade with the FSU countries was with other Russian regions and trade shares were flat (Figure 2). In the reform period, the average share of trade that is inter-regional rises to nearly eighty percent. The republics' average share of FSU trade with the Russian regions is about fifty percent in the pre-reform period and fairly constant. In the reform period, regional trade shares change decline somewhat on average.

[Figure 2 here]

While the movement in trade shares over time is suggestive of an increasing domestic bias in trade, shares alone do not tell us whether regions trade relatively more among themselves because we need to control for standard determinants of trade. For example, the increased Russian trade share among the regions may be the result of relatively higher income growth. Hence, we use a simple gravity specification to estimate the extent of domestic bias in trade. After estimating the benchmark model, we account for history and country-specific effects.

2.2 The Benchmark Specification

We use a gravity equation to examine trade within Russia. The gravity equation describes trade between two parties as proportional to the product of their incomes divided by the distance between them. Theoretical models supporting the gravity equation are numerous. In particular, the monopolistic competition model and the Heckscher-Ohlin model of trade both produce estimating equations similar to the gravity equation describing bilateral trade flows (Deardorff 1995).

We estimate a gravity equation on trade flows among and between nine Russian regions and the fourteen republics of the Soviet Union from 1987 to 1990 and from 1994 to 1996. The regression equation for each year in log levels is:

$$\text{TRADE}_{ij} = \alpha + \beta_0 Y_i + \beta_1 Y_j + \beta_2 \text{DIST}_{ij} + \beta_3 \text{RUSSIA} + u_{ij}, \quad (1)$$

where TRADE_{ij} is the log of shipments from region i to region j , Y_i and Y_j are the logs of gross regional product in regions i and j respectively, DIST_{ij} is the log of the distance from i to j , RUSSIA is a dummy equal to one for intra-Russian trade and zero for region

to republic trade, and u_{ij} is the error term, which we assume is uncorrelated across observations.

Table 1 reports the results from estimating the benchmark specification for each year in our sample. The RUSSIA variable pools all effects that make cross-border trade different from domestic trade. The coefficient on the RUSSIA dummy rises noticeably from the pre-reform period to the reform period. The coefficient of 0.46 on RUSSIA in 1996 is highly significant and implies that Russian regions traded 58 percent more with each other than is predicted by the model.⁵ In the pre-reform period, the regions did not trade more with each other. In fact, although not significant, the coefficient is negative in each year. Russian trade displays an increasing domestic bias after 1994, increasing from 1.34 in 1994 to 1.58 in 1996.⁶

[Table 1 here]

The insignificant and negative bias in trade between Russian regions in the pre-reform period is not surprising given that trade was centrally planned across all the FSU and there were no borders. In all specifications, we find that the elasticity of trade with respect to income and distance increases after disintegration. The coefficient on distance more than doubles in magnitude from -0.42 to -1.16. This change is hardly surprising because pre-reform trade over long distances was heavily subsidized. As these subsidies have been eliminated, the absolute value of the elasticity of trade to distance has increased. The coefficients on income also increase in the reform period. The coefficients in the reform period are much closer to the coefficients typically found on estimates of the gravity model in other countries.⁷ This suggests that gravity has set in and that trade patterns in the FSU are now determined in a similar way to the rest of the world.

2.3 Estimating the Effect of Adjustment Costs

In this section, we examine the effect of past linkages on trade. We include a variable describing past linkages, LINKS. Past linkages exist throughout the FSU as a result of central planning. For example, there are highly integrated production and consumption chains, infrastructure for trade, and business networks. These are likely to change slowly and imply greater current trade.

We assume that the current linkage between two areas is an increasing function of their past trade. We consider a more general notion of linkages through physical infrastructure, production chains, and business contacts. The intuition is that greater trade in the past generated more investment and a larger capital stock, in terms of production and infrastructure, that is geared toward that trade. As a result of central planning, trade in the pre-reform period was very similar across years. Thus, we assume that linkages will be positively correlated with centrally planned trade from the pre-reform period. This implies that we can include pre-reform trade patterns as a measure of current linkages.

The regression including a variable for past trade is reported in the first column of Table 2. The significance of 1987 trade in the equation for 1996 implies that much of current trade is still determined by past trade patterns. Hence, past linkages have limited the bias on current trade. Specifically, the results imply that a one percent increase in trade in 1987 leads to about one-half of one percent increase in current trade. The results further suggest that the bias we estimate on Russian trade is a short-run effect since the coefficient on RUSSIA does not change with the inclusion of past trade. If this dynamic relationship were to hold over the long run, it would imply that the Russian bias would approach a factor of 3, roughly in line with estimates from OECD countries.

[Table 2 here]

One problem with including past trade is that it may also be correlated with current trade because of other persistent variables that are not included, such as endowments or technology, but that are not related to past linkages. This is likely to be less of an issue in these data because trade in the pre-reform period was centrally planned and not based on comparative advantage. In addition, the countries in our study were trade partners by default and traded little with countries outside the FSU. Therefore, disintegration implies that the set of countries over which comparative advantage determines trade is larger. In addition, economies have changed dramatically since 1992. Some economies have grown while others have shrunk, countries now have different currencies, and prices are no longer equalized across regions and republics. Nonetheless, in the second column of Table 2 we use the fitted values of past trade from the simple gravity equation in the two-step least squares regression as a robustness check. The results remain robust implying that a significant amount of current trade is determined by past linkages.

An additional concern is the level of aggregation in the data. As noted in Section 2.1, five of the regions in our data contain sub-regions that form the Red Belt. Hence, for political reasons, these regions may be more insulated and less likely to trade with other regions. To control for this possibility, we include a dummy variable in the regression equation, REDBELT, which is one if a region contains part of the Red Belt. The results are reported in the third column of Table 2. The coefficient on REDBELT is small and not significant, suggesting that our results have not been affected significantly by the Red

Belt sub-regions. Moreover, the coefficient on RUSSIA remains significant and its magnitude is practically unchanged.

2.4 Allowing for Heterogeneity across Countries

Non-tariff barriers, currency variability, and differences in wages and prices across regions and republics may affect trade. To allow for this heterogeneity, we split the sample into two panels, i.e., pre-reform and reform, and estimate a country fixed effects model. This specification allows us to determine if the domestic bias in Russian trade is relatively broad based or whether it is driven by a few countries that have reduced trade with Russia. We exclude inter-republic trade from the sample and estimate the following equation separately for the pre-reform and reform periods:

$$\text{TRADE}_{ij,t} = \alpha_t + \beta_0 \gamma_{ij} + \beta_1 Y_{it} + \beta_2 Y_{jt} + \beta_3 \text{DIST}_{ij} + u_{ij}, \quad (2)$$

where γ_{ij} is a country dummy. For example, the dummy for Armenia is one when Armenia is either an exporter or an importer. The coefficient on a particular country describes how much that country trades with the Russian regions relative to how much the Russian regions trade among themselves. A coefficient of zero, for example, would mean there is no bias and the country's trade with the Russian regions is not significantly different from trade within Russia. A coefficient of zero on the country dummy is equivalent to a bias of one⁸, where a bias of one implies that the country's trade with Russia is explained by the same forces as intra-Russia trade. A bias greater than one means the Russian regions trade more with each other than with the country; and a bias

less than one implies the Russian regions trade more with that country than among themselves. For example, in the pre-reform period, the Russian bias against Armenia is 0.73 implying that the regions trade about twenty-seven percent less with each other as compared to their trade with Armenia. In the reform period, the regions trade seventy percent more with each other than with Armenia (a bias of 1.7).

Figure 3 shows the bias against each former republic in both periods, as calculated from estimating equation 2. In the pre-reform period, seven of the republics trade significantly more with Russia than is predicted by the model, four trade significantly less and there is no significant difference for the remaining three.

[Figure 3 here]

Earlier results suggested that the Russian regions did not trade more with each other in the pre-reform period, but did trade more with each other than with other FSU members in the reform period. This is confirmed here.⁹ The Russian bias against all of the republics, except Kazakhstan, rose from the pre-reform to the reform period. Georgia, Turkmenistan, Latvia, Estonia, and Lithuania each have experienced an especially large reorientation in trade away from Russia. Located directly south of Chechnya, Georgia suffered as a result of the Chechen war. Latvia, Estonia and Lithuania have consciously followed a policy of integration into Western Europe. For most of the sample period, Turkmenistan had a border dispute with neighboring Uzbekistan, through which the main trade route to Russia lay, making it difficult to transport goods to and from Russia. The coefficients on Belarus and Kazakhstan are both below one in the reform period, suggesting that both countries still trade at least as much with Russian regions as these regions trade among themselves.

3. Conclusion

The results in this paper show that trade has been reoriented within Russia and that trade flows within the FSU are still significantly impacted by past linkages. We have also shown that the elasticity of trade with respect to past linkages decreases over time, most likely due to a reorientation of production, infrastructure, and networks. This implies that the Russian bias we estimate will continue to increase over time. Decreasing trade between the Russian regions and the former republics will affect production, infrastructure maintenance and development, and business networks. For example, trade reorientation is likely to result in improvements or neglect of existing infrastructure.

To examine the extent to which this process has begun, we examine passenger train speed within the FSU as a proxy for investment in infrastructure that links regions to republics. We find that trains ran faster between most Russian regions in 1996 than in 1989 and trains to the former republics ran slower. For example, a train from the North region to the republics took about six percent longer on average in 1996 than in 1989. However, a train from the North to the other Russian regions took two percent less time on average in 1996 than in 1989. The largest travel time increase was between Chernozym and Uzbekistan; it took forty-one percent longer to travel between their capital cities in 1996 than in 1989. The sharpest decline was between Central Russia and Chernozym; it took nine percent less time to travel between the two capitals in 1996 than in 1989. This suggests that trains in Chernozym have been reoriented towards Moscow and away from the southern route to Uzbekistan.

Changes in travel times were accompanied by a change in the frequency of service. The frequency of trains traveling between Russian regions have remained

constant or improved for the most part, but train service from regions to republics has become less frequent. These results suggest that infrastructure between regions and republics is deteriorating and that connections for business travel across national borders are less frequent. While this may be partially a result of declining trade, it also increases the costs of international trade and facilitates trade reorientation.

Reorientation of infrastructure is also evident in the new projects and agreements that have emerged in most FSU countries. One striking example is the move of the Kazakh capital from Almaty in the south to Astana in the north and the construction of a highway and a railroad to link the two cities. Latvia and Estonia have built a fast train link between their capitals. Belarus and Russia recently agreed to deeper economic and political integration, including currency unification by the year 2005. These projects and agreements are likely to affect trade patterns in the FSU in the years to come. As these new linkages are developed and past linkages atrophy, the domestic bias in Russian trade will surely increase.

In the days of the Soviet Union, trade was centrally planned, trade links between regions and republics were very strong, and the regions did not trade more with each other than they did with the republics. The collapse of central planning, along with the disintegration of the Soviet Union, changed the determinants of trade. As gravity has taken effect, the elasticities of trade to income and distance have risen and are now similar to those found in the rest of the world. In addition, an increasing bias towards domestic trade in Russia has developed. Specifically, Russian regions traded sixty percent more with each other than with former republics in 1996.

The estimated border effects are lower than in previous studies because infrastructure and production have not been reorganized domestically in the short period since the collapse of the Soviet Union. Hence, the intra-national bias has been mitigated by the strong historical linkages that Russian regions have with former Soviet republics and by the costs of adjustment to redirecting trade and building new infrastructure. However, the erection of political borders will likely be followed by the development of new economic borders. This implies that the domestic bias in Russia, and in the new republics, will grow over time.

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Table 1: Benchmark Specification

	1987	1988	1989	1990	1994	1995	1996
Y _i	0.76* (28.5)	0.77* (28.4)	0.77* (28.5)	0.75* (29.0)	0.93* (17.7)	0.88* (15.2)	0.88* (16.6)
Y _j	0.72* (27.2)	0.72* (27.2)	0.72* (27.4)	0.73* (29.0)	0.90* (15.1)	0.89* (17.3)	0.82* (16.1)
DIST	-0.42* (-12.2)	-0.42* (-12.0)	-0.42* (-12.0)	-0.42* (-12.4)	-0.98* (-15.6)	-1.05* (-16.5)	-1.16* (-16.5)
RUSSIA	-0.12 (-1.6)	-0.10 (-1.3)	-0.11 (-1.3)	-0.15 (-1.9)	0.31* (2.3)	0.42* (3.1)	0.46* (3.5)
No. of obs.	504	502	495	494	492	486	487
Adj R-square	0.81	0.81	0.81	0.82	0.70	0.70	0.72

*Significant at the 1 percent level. Heteroskedasticity corrected t-statistics are in parentheses.

All regressions are run with a constant, but the values for the constants are not reported.

Table 2: Estimating the Effect of Adjustment Costs and the Similarity of Regions

	1996 (OLS)	1996 (TSLS)	1996 (OLS)
Y_i	0.51* (7.1)	0.61* (6.1)	0.81* (15.8)
Y_j	0.55* (7.7)	0.66* (6.1)	0.88* (16.3)
DIST	-0.92* (-12.8)	-0.99* (-12.5)	-1.15* (-16.5)
RUSSIA	0.46* (3.8)	0.46* (3.8)	0.44* (3.1)
PTRADE	0.57* (6.1)	0.39* (2.6)	
REDBELT			0.04 (0.4)
No. of obs.	486	486	487
Adj R-square	0.74	0.74	0.72

*Significant at the 1 percent level. Heteroskedasticity corrected t-statistics are in parentheses. All regressions are run with a constant, but the values for the constants are not reported.

Figure 1: Exports to FSU Countries Relative to Total Exports, 1990 and 1996

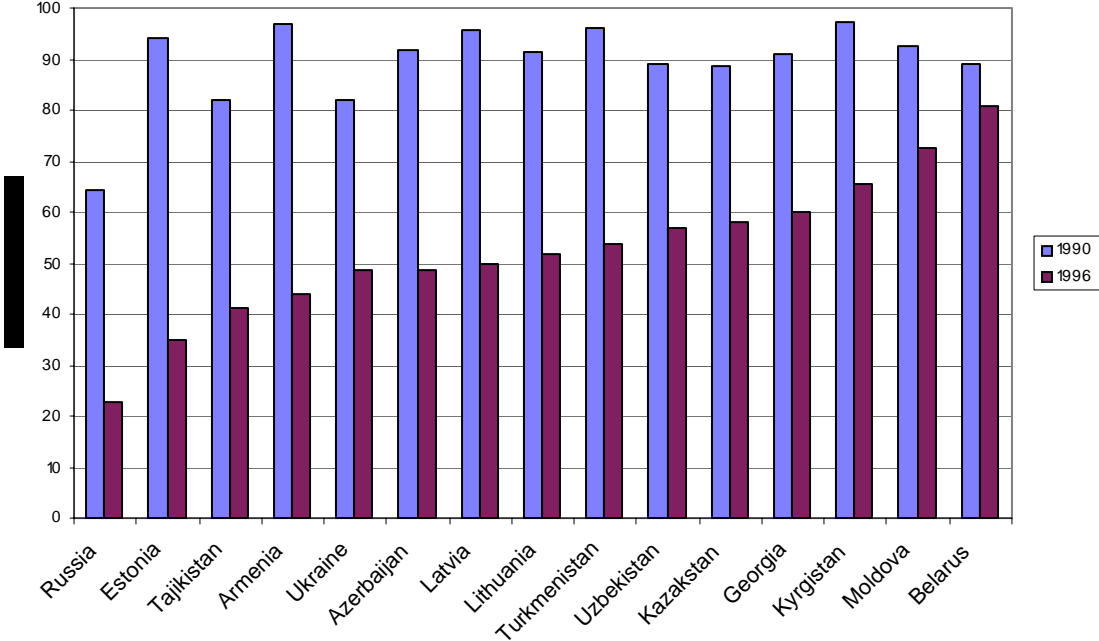
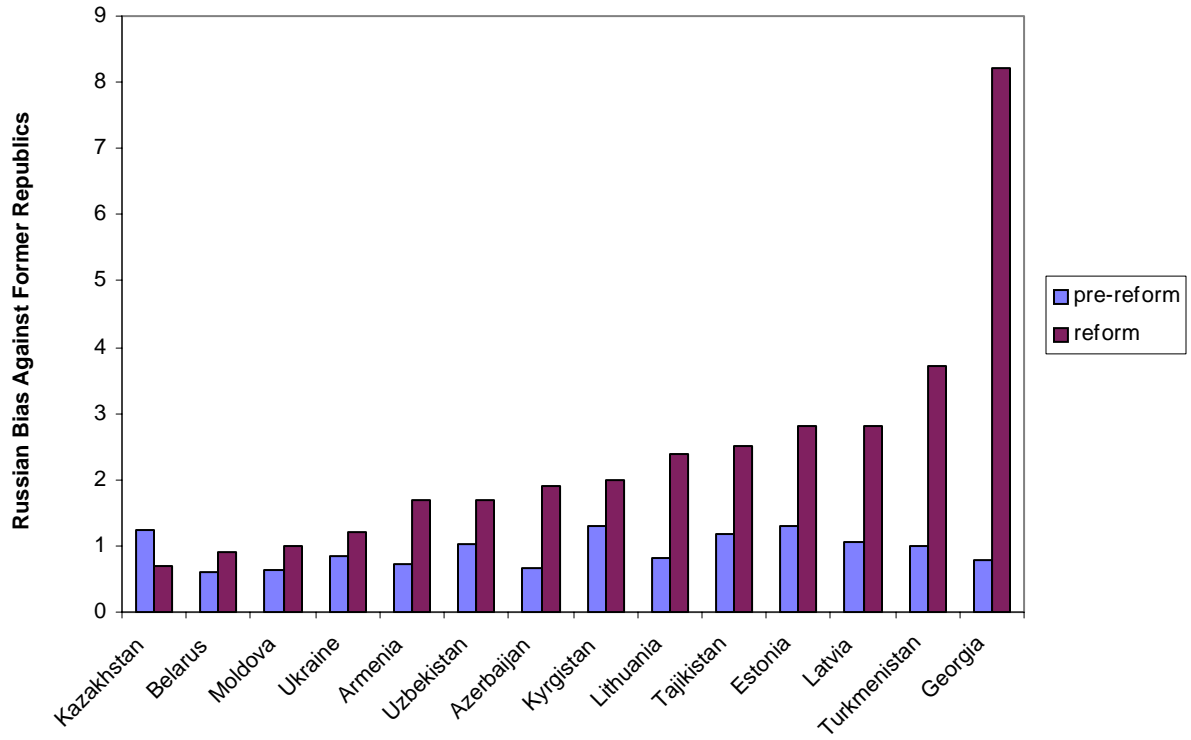


Figure 2: Share of Total FSU trade with Russia by Region and Republic
(average across regions and republics)



Figure 3: Russian Bias Against the Former Republics



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² An alternative way to evaluate the border effect is with price data. Engel and Rogers (1996) examine the relative price variability of similar goods among cities in Canada and the United States. They find that relative price variability between cities is significantly greater when a border is crossed.

³ Wei (1996) develops a technique to estimate the domestic bias in trade using input-output tables to estimate internal trade for countries without regional data. To estimate the border effect, he assumes that internal trade distances are one-quarter the distance between a country and its nearest trade partner. One problem with this method is that the border estimate is proportional to the assumed internal trade distance.

⁴ The results do not change materially if we use Vladivostok as the capital of the Far East region.

⁵ The interpretation follows from noticing that $e^{0.46} = 1.58$.

⁶ We also organized the data into two panels, the 1987 to 1990 period and the 1994 to 1996 period and used OLS and random effects to estimate coefficients. The regression is based on equation (1) with an added time dimension. Our results, although not reported,

confirm the result that the coefficient on RUSSIA was not significant in the pre-reform period. In the reform period, the OLS results estimate the bias to be 50 percent and the random effects procedure estimates the bias to be sixty percent.

⁷ Most comparable is trade between Canada and the United States because trade in North America is also land-based. McCallum (1995) and Helliwell (1999) find the elasticity of trade to distance is between -1.23 and -1.62 for these two trading partners. Helliwell finds the elasticity to be between -0.87 and -1.02 for OECD trade in 1992.

⁸ The interpretation follows from noticing that $e^0 = 1$.

⁹ We performed further robustness tests by looking at trade with other regions versus trade with republics for each region. Each regression was run on a region's trade with all of its trading partners. For all regions, we found that trade with the other regions relative to the republics expanded but no single region was driving our results.