IMPACT OF INTERNET ON THE BORDER EFFECT. CASE OF TRANSITION COUNTRIES.

by

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Abstract

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National borders are considered to have large trade deterring effects. To estimate the impact of national border on international trade between eleven transition countries during the period 1997-2001, this paper uses gravity model and method of approximate internal trade generation developed by Wei (1996). We found that averaged over transition countries intranational trade is about 18.5 times as high as international trade with other transition country of similar characteristics. Internet appeared to have negative influence on the size of border effect across transition countries, but this impact is modest. Thus, inclusion of the Internet use measure to the basic regression decreases the estimated border effect from 18.5 to 18, reflecting the fact that positive effect on bilateral export of Internet on use in exporting country is partly offset by negative effect of Internet use in importingcountry.

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GLOSSARY

Border effect. The extent to which volume of domestic trade exceeds the volume of international trade.

CEFTA. Central European Free Trade Agreement

EU. European Union

SUR. Seemingly Unrelated Regression

Chapter 1

INTRODUCTION

Recent evidence suggests that despite the growing trade liberalization and integration, national borders still have significant trade deterring effect i.e. firms sell more to domestic clients than to identical foreign customers. This puzzle was first presented by McCallum (1995) whose work gave rise to a large number of literature on so-called border effects. Obstfeld and Rogoff (2000) referred to the border effect as one of the "six major puzzles in international macroeconomics".

McCallum found that Canadian provinces traded over 20 times more with each other than they did with states in the US of the same size and distances. Further re-estimations reduced this number to the factor 12 (Helliwell (1998), which is still surprisingly big number, considering the fact that USA and Canada are one of the most opened economies in the world.

Several studies arrived at similar results looking at trade in North America, OECD and Europe. Most of these studies want to find additional estimates for the size of border effect, while and still reporting significant "home bias" (Helliwell (1998), Head and Mayer (2000), Wei (1996), Nitsch (2000)). For example border effect for OECD countries by was at the level of 2.5 (Wei (1996) whereas for EU countries at the level of 10 (Nitsch, 2000).

Despite rather wide number of studies for developed countries evidence on transition countries is still quite scarce and undeveloped issue in the literature.

Works done for transition countries estimate border effect only for very limited sample of transition countries (Sousa and Disdier, 2002).

There are three possible factors that determine the border puzzle. Firstly, it is high elasticity of substitution between domestic and foreign goods that can result in high border effect; in this case we can do nothing to reduce it. Secondly, high border effects partly can arise due to high tariff and non-tariff barriers to trade, which are subject to policy intervention. And thirdly, border effect arises because of differences in transaction costs connected with entry to the foreign market. Evans (2003) argues that transaction costs differences between foreign and domestic products are liable for about one half of the estimated border effect. Thus, this factor appears to become very important determinant of border effect; obviously, there is no role for trade policy interference, and in this case great attention should be paid to measures that can decrease difference in transaction costs of trade between countries.

Information and communication costs are the main sources of fixed costs associated with entering foreign market, which appeared to be an important determinant of trade flows and patterns (Roberts and Tybout (1997), Bernard and Wagner (1998), Freund and Weinhold (2000)). Most of the fixed trade costs connected with national borders and thus can influence border or "home bias" effect. They include costs of finding information about the market, advertising the product and establishing distributional framework. In this case, Internet with its informational and communicational resources (such as E-mail, E-markets, searching engines, etc.) has potential to substantially decrease these costs and thus to reduce the level of "home bias" or border effect.

The aim of this work is to estimate border effect for eleven transition countries and to check whether Internet influences transaction trade costs between

transition countries and thus can have impact on the border effect reduction during the years 1997-2001.

First part of the paper is dedicated to literature review which covers issues of border effect, ways of Internet's influence on border effect and trade. In chapter 3 and 4 methodology, specification and data used in estimated model are covered. Fifth chapter discusses the results of estimation received and the paper is concluded in Chapter 6.

Chapter 2

LITERATURE REVIEW

2.1 *Border Effect.*

Many economists believe that national borders represent large and mostly unidentified barrier to trade and reveal existence of so-called "home bias" puzzle. Border effect (or "home bias") is the extent to which volume of domestic trade exceeds the volume of international trade. In other words two different countries trade much less with each other than do two regions within one country, taking into account income, size and distance.

Since the study of McCallum (1995) where it was found that inter-provincial trade in Canada is 22 times as large as Canada's international trade with United States, there has been growing research effort done to measure and understand trade border effect.

There are two main approaches used in empirical studies for estimation of border effect using the gravity model. The first calculates it by comparing interregional and international trade data, as have been done by McCallum. John Helliwell (1996,1998) has extended McCallum's basic sample to cover 1988-1996, applied some robustness checks and found only slight variations in the estimated border effects. The most theoretically consistent estimate of the border effect done by Anderson and Wincoop (2003), they analysed and compared border effect both

for Canada and United States. According to their findings, Canada's border effect was around 16, while the United State's border effect was at factor 1.5 which reflects relatively large size of U.S. economy. They proved theoretically and confirmed empirically that small countries have larger border effect than larger economies, because even a small drop in international trade can lead to large increase in trade within a small economy.

A number of studies on measuring border effect have been done using sectoral data. Head and Mayer (2000) estimated the size of border effects in the European Union using industry-level data. According to their estimations, on average border effect was at the level of 14. Having finding out no correlation between non-tariff barriers and the border effects across industries, author concluded that the main reason for border effects lies in consumers' preferences bias towards domestic goods.

The second type of border effect estimation based on the comparison between own-country sales data (intranational trade) and foreign trade of the country. Wei (1996) calculated intranational trade as total country's production less total export. According to his findings, home bias in the goods market among OECD countries from 1982-1994 was at factor 2.5, which was slowly, but steadily declining with years. Nitsch (2000) applies Wei's approach for analysis of national borders' impact on trade within the European Union and offers new proxy for average distance within a country. According to his estimates, averaged over all EU countries, intranational trade 10 times larger than international trade with other EU country of the same size and distance.

Despite rather wide number of studies for developed countries as North America, EU and OECD countries, evidence on transition countries and developing countries is still quite scarce an remains rather undeveloped issue in

the literature. Sousa and Disdier (2002) used "border effect" approach to estimate the effect of legal framework on the bilateral trade flows of Hungary, Romania and Slovenia with EU and CEFTA (Central European Free Trade Agreement) for the period 1995-1998. The estimated border effect for these three transition countries is at factor 30, moreover border effects are more significant towards CEFTA countries than towards EU countries.

Another sort of "border effect" literature instead of measuring tries to explain why national border have so significant trade deterring effect and find out are there any policy instruments that can influence them (Evans (2001), Evans (2003)). For the most part, existence of border effects can be explained by three main factors: "nationality", "location" and policy-related factor. So-called "nationality" factor indicates the importance of degree of substitutability between domestic and foreign goods. Thus, the higher elasticity of substitution leads to higher border effect, because consumers purchase foreign goods less readily. Using data for OECD countries Evans (2003) found that "nationality" factor provides only partial explanation of border effect. Another factor that increases border effect is existence of trade distortions caused by such as tariffs, nontariff barriers, regulatory differences, which can explain up to 34% percent of the effects of borders (Evans, 2003). Up to 50% of border barriers is due to presence of so-called "location" factor, which reflects the difference in costs of gathering information about foreign and domestic goods. Local consumer finds it cheaper to find and gather information about domestic goods than about foreign ones, thus creating home bias towards local products. Thus, differences in transaction (mostly information) costs appeared to be important determinant of border effect size at least as much as policy-induced barriers.

Internet through the influence on fixed costs of trade has potential to reduce border barriers of trade (at least their information and communication part).

2.2 *Internet development in transition countries.*

The number of Internet users as percentage of population varies significantly across transition countries, but is still very low even by European standards. Despite the fact that growth is very rapid in a number of countries but, as the base is very low, we should not expect convergence to developed countries very soon.

According to Economist Intelligence Unit 2003 e-readiness ranking which measures the extent to which a market is conductive to Internet-based opportunities (categories evaluated are connectivity, business environment, consumer and business, legal and policy adoption, social and cultural, supporting e-services) and covers the world's 60 largest economies, Ukraine is on the 54th place, Russia on the 48th, Czech Republic, Hungary, Poland, Slovakia on the 27th, 29th, 30th and 34th place respectively.

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Transition countries are not very successful in E-commerce development which is suggested to bring the biggest gain from Internet. Despite the rapid growth of Internet users in developing and transition countries in 2001-2002 (the number of Internet user has grown up 39.9 per cent (UNCTAD, 2002)) due to development and infrastructure factors does not directly led to increase in number of electronic commerce users. Therefore proportion of both Internet and e-commerce users in transition countries are lower than on average in the Western Europe. Despite rapid growth of e-commerce in transition countries, its' volumes are still very low by forecast it is unlikely that in 2005 they will reach 1% of global e-commerce. Now 90 per cent of e-commerce activity in transition countries takes place in three countries Poland, the Czech Republic and Hungary (NIU, 2002).

Comment [j2]: This sentence doesn't make sense. There seem to be 2 points to make here. Make them in two sentences or maybe paragraphs.

The main factors that prevent wider usage of e-commerce are common for transition and developing countries; they are low per capita income, sometimes underdeveloped and relatively expensive telecommunications, poor legal framework and underdeveloped payments and credit systems (UNCTAD (2002), UNCTAD (2003), Parangrya, 2000).

2.3 *Internet and trade.*

According to survey conducted by World Bank (Clarke and Wallsten, 2004) enterprises that export are more likely to have an access to Internet than those who do not export. This difference between exporters is true for both developed and developing countries see Table 1.

The Internet access may affect export behaviour in a number of ways: firstly Internet could make it less costly to communicate with potential suppliers and customers in the foreign markets. In this sense Internet is a device that affects variable communication costs of trade. Fink et al (2002) found that international variations in communication costs (proxied by per minute country-to-country calling prices) have a significant influence on trade patterns. Internet from its part offers equal communication costs with countries all over the world. Using Internet you have to pay only per hour fee to your Internet provider and per hour local call cost. Local call costs are much cheaper than international and cost of Internet use is now moderate even for developing countries, thus Internet appears to be a relative cost-effective substitute for international communication compared to telephone calls and fax.

Compared to other communicational services Internet is becoming relatively in expensive even in the developing countries. Therefore, information about distant markets are available for lower cost, enabling suppliers from developing country and buyer from developed to obtain information about each other, thus decreasing transaction costs associated with overcoming interorganizational and geographical barriers.

Another possible influence of Internet on trade comes from its ability to create global trade markets (Freund and Weinhold, 2000). Internet through creation of global markets for specific goods, where numerous buyers throughout the world meet numerous sellers, has potential to decrease fixed (or sunk) cost associated with particular market.

Fixed costs are considered to be an important deterrent from the exporting process. Empirical evidence reports about substantial influence of fixed entry costs into foreign market. Bernard and Jensen (1997), Bernard and Wagner (1998) and Roberts and Tybout (1997) all show that having exporting in the past substantially increases probability of a firm exporting today.

Fixed costs are not homogenous among the firms and the reason for this diversity lies in differences in knowledge of foreign markets or in level of productivity in learning about exporting (Evans, 2000). Fixed costs include costs of finding out the information about market, advertising your products, establishing a distributional network. Firm for which fixed costs, associated with exporting or with entrance to the new market, are higher than some threshold, do not export Internet reduces sunk costs through global exchanges and searching engines enables sellers advertise to numerous buyers in one place.

By means of global exchanges and searching engines Internet also can overcome costs associated with imperfect information. In the search theory of trade

developed by Rauch (1996) local networks are given the credit of overcoming these costs. Costs associated with searching for trading partners (especially for differentiated goods) are highly dependent on proximity and relative familiarity with the market, therefore searching process on the new market due to the costliness does not end up with best much. At long last this search results in occurrence of trading networks (rather than markets), which play important role in explaining existing trade patterns. At the same time, Internet via large virtual organized exchanges or by means of searching engines enables buyers to find information about large number of sellers and sellers to notify buyers of prices; thus, costs of the searching process are reduced so it more probably can end up with the best match. Internet, expanding the export opportunities by means of global virtual markets, has potential to reduce the importance of already existing trade networks thus, providing developing countries (without established trade networks) with more opportunities for trade expansion.

Several empirical studies have asked whether Internet use effects trade. One of the first works belongs to Freund and Weinhold (2000). Using gravity model based on sample of 56 countries they explored the level of influence of Internet on total trade volumes in 1996-1999, and found that through 1997-1999 Internet had a significant influence on trade volumes. According to their estimations, a 10 percent increase of the number of Internet hosts (which was used as proxy to measure "cybermass") would lead to a 1 percent increase in trade. Their research also revealed reduced importance of past linkages (already existed trade ties), thus confirming the ability of Internet to decrease information and communication costs. The decrease in importance of past linkages had a positive effect on trade for developing countries[1] and revealed bigger effect of Internet on trade for them than for developed countries.

[1] Which were represented mostly by Asia-Pacific, Middle East and Africa countries with only two transitional economies: Poland and Hungary.

Study concerned transition countries was conducted by Clarke (2002) and investigated whether Internet access has any influence on the export decision of the firm. On the sample of transition countries[2] it was found that enterprises that have access to the Internet export more than those without Internet connection. The result remained positive, even after controlling for factors that might influence both export and Internet connectivity (size of the enterprise, foreign ownership, enterprise performance), country-level controls were also used. It was not revealed whether Internet access influenced transaction costs, search coasts or both of them. The further research also found that despite the wide possibilities that Internet offers to the export services that do not require face-to-face transactions that Internet influences service sector enterprises more than industrial enterprises.

Clarke and Wallsten (2004) using cross-section data for the year 2001 for developed and developing countries, found that Internet has positive influence only on volumes of export from developing to developed countries. In other words, higher Internet penetration does not lead to more export from one developing or developed country to another developing or developed country. While Internet access is a general case for the enterprises in the developed countries it is less common in developing countries, thus "being connected to the Internet would seem to be a greater advantage for enterprises in developing countries with respect to exporting to developed countries (i.e., to countries where their counterparts are likely to have access)". Clarke and Wallsten (2004) raise the problem of possible reversed causality between export and Internet, to

[2]Albania, Armenia, Azerbaijan, Bulgaria, Croatia, the Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, the Kyrgyz Republic, Lithuania, Moldova, Poland, Romania, Russia, Slovenia, The Slovak Republic, Ukraine, and Uzbekistan

deal with this dummy variable, indicating whether government allows for a data lines monopoly, was used as and instrument.

Chapter 3

METHODOLOGY

The empirical analysis is based on a gravity model of trade which states that the amount of trade between two trading countries is an increasing function of their national incomes, and a decreasing function of the distance between them. Gravity model is one of the main tools that are linking the trade barriers to trade flows and its basic specification can de represented as:

$$\ln(EXP_{ij}) = \alpha + \beta_1 \ln(GDP_i) + \beta_2 \ln(GDP_j) + \beta_3 \ln(D_{ij}) + \varepsilon_{ij}$$

The basic specification can be augmented by other variables that are assumed to have influence on bilateral trade flows. Authors of many studies found statistically significant such variables as adjacency (sharing a common border) and a common language between country pairs. Deardorff (1998) argues that not only direct distance but relative distances of trading partners also have impact for the bilateral export volumes.

I estimate the border effect for trade within eleven transition countries and to check the influence of Internet on the home bias by augmenting gravity model with Internet proxies (number of Internet users per 10 thousand inhabitants).

The theoretical framework for incorporating home bias effect into gravity model follows Wei (1996).

We maximize the utility of the country j, where the representative agent which consumes C_{ij} of good *k*, p_{ij} the price of good *k* in country *j*, Y_j - the income of the country. Country *j* maximizes the following utility function

$$\max U_j = \sum_i \beta_i c_{kj}^{\theta}$$
$$s.t. \sum_i p_{kj} c_{kj} = Y_j$$

where $\theta = (\sigma - 1)/\sigma$ and σ is the elasticity of substitution between any two consumption goods.

Thus, optimal consumption plan for any good k is:

$$c_{kj} = \frac{Y_j \beta_k^{\sigma}}{p_{kj}^{\sigma} \sum_i p_{ij}^{1-\sigma} \beta_i^{\sigma}} \quad (1)$$

Relating β_k with country k's income:

$$\beta_k^{\sigma} = \frac{s_k}{p_k \sum_h \frac{s_h}{p_{kh}^{\sigma} Q_h}} \quad (2)$$

where Q_h is the CES index of all prices in country *h*, s_k country's *k's* share in the world income; and then substituting (2) into (1) we get

$$c_{kj} = \frac{Y_j Y_k / Y_w}{p_{kj}^{\sigma} Q_j p_k \sum_i \frac{s_h}{p_{kh}^{\sigma} Q_h}} \quad (3)$$

For simplicity it is assumed that transport costs take the iceberg form (i.e. fixed part of the good is lost because of transit) and all other barriers can be

summarized by an ad valorem tariff rate, therefore the price of good *k* in country j can be presented as product of three terms:

$$p_{kj} = p_k D_{kj} t_{kj}$$

Normalize the prices of all goods in the countries of production to be $p_k = 1$ for all *k*. Let us also assume that $t_{kj} = \begin{cases} t_j \; if \; k \neq j \\ 1 \; if \; k = j \end{cases}$

Combining all assumptions Wei (1996) and taking logarithm on both sides comes to central equation that describes export from country k to j.

$$\begin{aligned} &\ln C_{kj} = \ln Y_k + \ln Y_j - \sigma \ln D_{kj} - \ln Y_w \\ &+ \sigma(H_{k=j} - 1)\ln(t_j) + \ln(R_k) + \ln(R_j) \end{aligned} \qquad (4)$$

where $H_{k=j}$ - variable takes the value of one when k=j and zero otherwise.

$$R_k = \left[\sum_i D_{ki}^{-\sigma} \frac{s_i}{t_{ki}^{\sigma} Q_i} \right]^{-1} \text{ and } R_j = \left[\sum_i D_{ij}^{1-\sigma} (t_{ij}^{1-\sigma} \beta_i^{\sigma}) \right]^{-1}$$

which are some weighted averages of exporting country k and importing country j distances respectively from all of its trading partners.

From the equation we can derive precisely what is home country bias (how much country's imports from itself is bigger imports from the identical foreign country (with the same size, distance, remoteness)).

Home bias of country j =

$$\ln(C_{jj}) - \left[\ln(C_{kj}) : k \neq j, Y_k = Y_j, D_{kj} = D_{jj}, R_k = R_j \right] = \sigma \ln(t_j)$$

As can be seen the home bias depends on both σ - degree of substitutability and barriers to trade.

The final specification of the model is as in Wei (1996) and Nitsch (2000) with incorporated influence of Internet

$$\ln(X_{kj}) = \beta_0 + \beta_1 \ln(GDP_k) + \beta_2 \ln(GDP_j) + \beta_3 \ln(Dist_{kj}) + \beta_4 \ln(R_k) + \beta_5 \ln(R_j) + \beta_6 Lang + \beta_7 Adj + \beta_8 \ln(Int_k) + \beta_9 \ln(Int_j) + \gamma Home_{kj} + u_{kj} \quad (5)$$

Where *Home* - dummy that takes value 1 if *i=j* and zero otherwise, and would measure the border or home bias effect; R_k (R_j) - relative remoteness of a country from trading partners in the sample and calculated by formula $R_k = \sum_k \frac{GDP_i}{Dist_{ik}}$. Intranational distance ($Dist_{kk}$) following the Nitsch (2000) measured as $Dist_{kk} = (1/\sqrt{\pi}) \cdot \sqrt{area}$, where *area* is the land area of the country *k*.

Chapter 4

DATA DESCRIPTION

Data set covers eleven transition countries Ukraine, Russia, Bulgaria, Croatia, Czech Republic, Slovak Republic, Slovenia, Poland, Romania, Hungary, Macedonia for five years, 1997, 1998, 1999, 2000, and 2001.

The data on bilateral trade between distinct country pairs, exchange rates are from Countries in Transition 2003: WIIW Handbook of statistics.

Ideally, following the Wei (1996) intranational trade is defined as difference between its total goods production and its total exports to foreign countries. Since I do not have statistics of total goods production for transition countries I constructed this measure in the following way:

1) As in the Wei (1996) goods part of GDP was computed: GGDP=GDP-services-transport (GDP, service and transport data are from WDI indicators).
2) Computation of shipment (production)-to-value added ratios (using data of industry level production from WIIW Industrial Database Eastern Europe (for Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Poland, Romania, Slovak Republic and Slovenia) and from Derzhkomstat for Ukraine, Goskomstat for Russia.
3) Total goods production=(shipment/value added)*GGDP

4) Import from itself=GGDP-total export of goods. Data for total exports of goods from WDI indicators.

Statistics of population, land area is from and number of Internet users WDI indicators.

Statistics of number of Internet hosts is from International Telecommunication Union.

Distances between countries are the "as-the-crow-flies" distance between their capitals in km from www.indo.com/distance.

For descriptive statistics see Table 2.

Chapter 5

RESULTS

To estimate the home bias in transition countries and influence of Internet on the border effect following the Wei (1996), Helliwell (1997) and Nitsch (2000) I estimate the system of five equations (separate equation for each year (1997-2001)). The system is estimated by employing the method of Seemingly Unrelated Regression (SUR), which deals with correlation across the years. To improve efficiency of the estimation coefficients on the variables are restricted to be constant (while year specific intercepts are allowed).

The basic results are reported in the Table 3. The first three columns represent results for traditional "home bias" estimation. The first column presents results from traditional "gravity-based" model. All variables have expected sign and are statistically significant. For example, one percent rise in exporter's or importers GDP is associated with 0.70-0.80 percent rise in export volume. The coefficient on distance whish is negative and significant, indicates that one percent increase in distance is associated with 0.94 percent decrease in trade. The home bias is at the level of 4.21 and significant at the level of 1 percent. This figure suggests that a country's trade with itself on average is about 67.36 [=exp (4.21)] higher than its trade with foreign transition country of the same size and distance between exporter and importer. This estimate of home bias is 10 times as large as corresponding estimate for EU for the same model specification.

In column 2 the traditional gravity model is augmented with common language (Language) and common border (Adjacency) dummies, relative distance measures (Remoteness) for importer and exporter country are added in the 3rd column. All of the new regressor variables have correct sign and almost always are statistically significant. The inclusion of the remoteness measures as twice as much decreases the coefficients before importer and exporters GDP: one percent increase in exporter's (importer's) GDP now is associated with 0.5-0.33 percent rise in exports. According to column 3, one percent increase in remoteness of importer or exporter would increase the bilateral export by more than 1 percent (1.17-1.18%). Language dummy appeared to be insignificant, whereas countries that share common border tend to trade 194% [=exp (1.08)-1] with each other than otherwise. With this specification estimated home bias (or border effect) falls to the factor 18.54 [=exp (2.92] which is still twice as higher as estimated home bias for EU countries. Although, this estimate of border effect is as one and a half times lower than home bias estimated for Hungary, Romania and Slovenia by Sousa and Disdier (2003). These results are consistent with implications from the Anderson and Wincoop model, that smaller countries tend to have larger boder effect than larger economies.

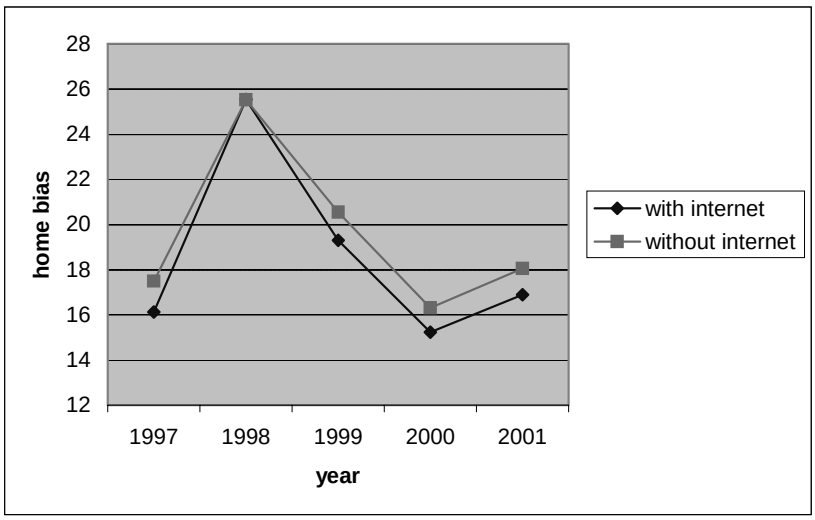
Table 4 represents results of the most interest, it contains estimation coefficients for the regression that include Internet development measures as one of the explanatory variables. What is important in these new specifications almost all variables (including variables of interest) are significant. The "Internet" variables are appeared to be statistically significant but coefficient before variable that indicates Internet use proxy for importer's country is of rather unexpected negative sign. The one percent increase in the number of Internet users (per 10000 of people) in the exporter's country leads to 0.132

percent increase in bilateral export, while one percent increase in the number of Internet users in importer's country leads to 0.11 percent decrease in bilateral export. At the same time, home bias decreased on 0.04 points or from 18.54 [=exp (2.92)] to 18.00 [=exp(2.89)] this indicates only very modest impact of Internet on trade within chosen sample of transition countries. This result is consistent with estimations of Clarke and Wallsten (2004) who found that Internet had impact on trade flows between low and middle-income countries in the year 2001 but this impact is very modest. To investigate deeper the Impact of Internet on border effect I included home dummy and number of Internet users interaction term (see Table 4, column 2). Coefficient on interaction term indicates that one percent increase in number of Internet users leads to 0.17 decrease in home bias coefficient.

As the robustness check I replace the measure of Internet use, number of Internet user (per 10000 inhabitants) on number of hosts (per 10000 inhabitants). The results are broadly similar to the results using Internet users (see Table 4, columns 3-4). The coefficient on Internet hosts in exporter's country is statistically significant, while coefficient on Internet hosts in importer's country significant only at 15 per cent level. Thus, increasing the number of Internet hosts (per 10000) in exporter's country by one percent would increase bilateral export on 0.2 per cent, which is higher than influence of Internet users. The home bias is estimated at the factor of 17.12 [=exp (2.84)], which also indicates greater influence of Internet hosts (per 10000 residents) as Internet measure on border effect. The interaction term coefficient indicates that one per cent increase in number of Internet host leads to 0.24 percent decrease in home bias coefficient.

There can be two possible endogeneity problems in my regression. Firstly, is connected with the GDP variables as regressors: due to the export-led growth hypothesis more export can contribute to larger GDPs. Secondly, endogeneity is associated with "Internet" variable. It can be the case that not only higher Internet penetration would lead to more export, but more export (especially from developed countries) can lead to higher Internet adoption. Countries that are more open to the outside world are more like to be advanced in technologies (Onyeiwu, 2002). Undertaking Darbin-Wu-Hausman test we rejected the null hypotheses that the variables representing exporter and importer's GDPs are endogenous.

Figure 1. ***Evolution of Home Bias in Transition Countries.***



The panel data allows for estimation of the home bias evolution across the years 1997-2001. The visual representation of the basic results depicted on the Figure 1. The estimated home bias based on OLS regression of equation (5).

As can be seen from the figure, there is rather sharp increase in the average home bias in transition countries in the year 1998, which can be one of the 1998-year's financial crisis consequences. In the year 2000 the average level of home bias restored its before-the-crisis value, while in the year 2001 border effect among transition countries started to grow again. As most of the countries in the sample were EU-candidates at that date this increase can be considered as a result of their movement to the European Union, or in other words, increase in border effect towards transition countries and decrease towards EU-members.

Figure 2. ***Home bias on a country level.***

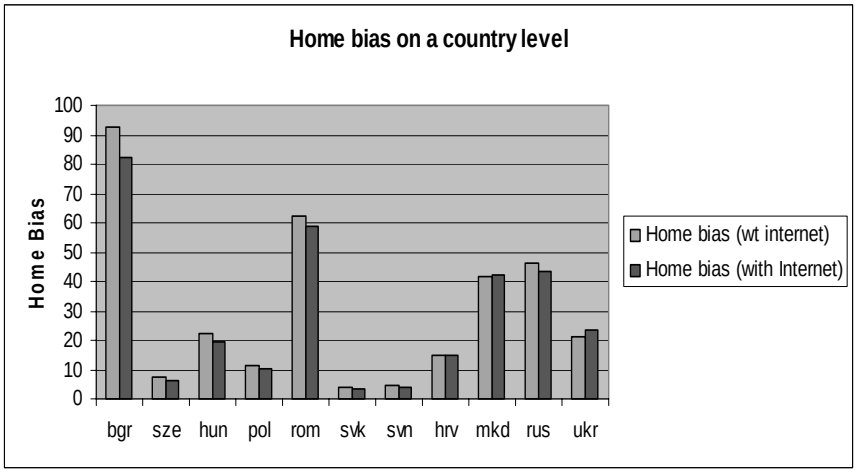


Figure 2 plots the average home bias over 1997-2001 for all countries in the sample. Bulgaria has the biggest border effect, it is around 90, while inclusion of Internet decreases home bias on the factor 10. Then go Romania, Macedonia and Russian federation with home bias at factor which ranges from 60 to almost 40, with modest impact of Internet on it. Ukraine's and Hungary's border effect estimated at the level of 20, while Internet

development in Ukraine even increased home bias. Negative impact of Imternet on Ukraine's home bias can be explained by the fact that low Internet development (which is the at the lowest level among transition countries) decrease costs of finding information only about domestic goods, thus increasing transaction costs difference with foreign countries. The least closed economies towards other transition countries are Czech Republic, Poland, Slovak Republic, Slovenia, Croatia home bias for them ranges from 3 up to 12.

What are the reasons for the modest impact of Internet on the border effect for this sample of transition countries? Number of Internet users per 10000 inhabitants grows almost with the same rate in all countries in my sample. Rise in Internet use in exporter's country leads to decrease in information costs and makes it is easier to advertise their product in foreign market, therefore increases number of exporting firms. At the same time increase in Internet use in importers' country decreases cost of finding information about foreign products form transition countries and has negative effect on the size of home bias; it is also reduces information searching costs on domestic products and products from developed countries. So modest impact of Internet on the size of border effect in particular and export between transition countries in general can be explained by the fact that Internet use in transition countries induces almost equi-proportional change in efficiency on importer and exporter's sides thus does not lead to significant overall efficiency gain, and to great decrease in differences in transaction trade costs.

Another possible explanation covers the fact that as Internet do not have great influence on reducing border effect towards transition countries it may have much greater effect on decreasing border effect towards developed countries i.e. European Union members. This suggestion is consistent with findings of

Sousa and Didier (2003), who found that Hungary, Romania and Slovenia have lower home bias towards European Union countries than towards other transition countries.

Chapter 5

CONCLUSIONS

National borders are considered to create large and mostly unrecognizable barriers to trade. This study makes attempt to estimate the effect of national borders for rather the sample of eleven transition countries during the period of 1997-2001. Another part of research rises the question whether differences in transaction costs which are considered to be one of the most important factor that determine the size of the border effect can be influenced by Internet development. In other words whether Internet can decrease the home bias in trade between transition countries.

We find that trade an average transition country exports about 18.5 times more to itself than to a partner country, after adjustments made for sizes, distance, common language and remoteness. This figure confirms the fact that small economies tend to have larger border effects than large countries. At the same time this estimate is almost two times lower than home bias obtained for transition countries by Sousa and Didier (2002).

According to our estimations Internet indeed has negative impact on the size of border effect, but this influence appeared to be rather modest. Inclusion of Internet use variables to the estimated model leads to decrease in border effect from 18.5 to factor 18. This modest impact can be write off to the fact that Internet use in exporting and importing has different in direction of influence on bilateral trade. Thus while Internet use in transition countries grows almost with the same rate, it is expected to bring only faint impact on the border effect as well

as on volumes of bilateral trade. In this aspect, Internet would bring more gains for transiton economies in case of trade with developed countries. This issue can be the question for further researches.

In sum, Internet development and promotion should be set among prior policy goals for transition countries, in order to be able enjoy all benefits of inreasing world opennes.

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Table 1

% of Manufacturing Enterprises with Internet Access

Country	Year	All	Exporters	Non-Exporters	Difference between exporters and non-exporters
Albania	2002	38.2%	65.3%	26.9%	38.4%
Algeria	2002	41.5%	78.9%	39.6%	39.3%
Armenia	2002	43.3%	84.6%	31.1%	53.6%
Azerbaijan	2002	34.1%	63.0%	28.2%	34.8%
Bangladesh	2002	70.6%	86.0%	58.9%	27.1%
Belarus	2002	56.0%	79.2%	46.6%	32.5%
Bosnia and Herzegovina	2002	60.4%	75.4%	52.6%	22.8%
Bolivia	2001	56.3%	86.0%	50.8%	35.2%
Bulgaria	*2002*	*63.2%*	*95.6%*	*49.1%*	***46.8%***
China	2001	71.2%	81.8%	64.7%	17.0%
Croatia	*2002*	*79.7%*	*89.0%*	*72.1%*	*16.9%*
Czech	*2002*	*77.2%*	*90.5%*	*69.6%*	*20.9%*
Estonia	2002	91.8%	98.6%	86.0%	12.5%
Ethiopia	2001	39.2%	93.8%	35.1%	58.7%
FYR of Macedonia	*2002*	*50.0%*	*70.6%*	*41.0%*	***29.6%***
Georgia	2002	41.4%	72.7%	30.8%	42.0%
Hungary	*2002*	*75.2%*	*92.8%*	*66.3%*	***26.5%***
Kazakhstan	2002	45.6%	75.6%	38.7%	36.8%
Kyrgyz Republic	2002	34.1%	58.1%	27.6%	30.5%
Latvia	2002	63.1%	93.0%	53.8%	39.2%
Lithuania	2002	72.0%	98.4%	60.1%	38.2%
Moldova	2002	38.5%	65.5%	25.0%	40.5%
Morocco	1999	49.3%	59.0%	35.9%	23.1%
Mozambique	2002	73.8%	95.0%	70.6%	24.4%
Pakistan	2002	33.8%	74.9%	23.7%	51.2%
Peru	2002	57.5%	77.0%	40.4%	36.6%
Poland	*2002*	*69.0%*	*88.5%*	*60.3%*	***28.2%***
Romania	*2002*	*59.2%*	*84.4%*	*50.8%*	***33.6%***
Russia	*2002*	*57.3%*	*88.2%*	*49.1%*	***39.1%***
Slovakia	*2002*	*84.7%*	*91.5%*	*78.4%*	***13.1%***
Slovenia	*2002*	*92.6%*	*97.1%*	*87.2%*	*9.8%*
Tajikistan	2002	13.1%	25.7%	10.1%	15.6%
Turkey	2002	54.3%	77.8%	45.1%	32.6%
Ukraine	*2002*	*60.0%*	*85.2%*	*51.0%*	***34.2%***
Uzbekistan	2002	23.1%	60.6%	17.6%	43.0%
Yugoslavia	2002	71.2%	88.4%	62.2%	26.2%

Source: Investment Climate Survey, The World Bank * Taken from Clarke and Wallsten (2004)
* in italics estimated transition countries.

Table 2
Descriptive Statistics

Variable		Mean	St. Dev	Min	Max	Obs.	
Ln(Export(kj))	Overall	18.8323	2.461812	13.06049	26.4496	N =	605
	Between		.0828186	18.73645	18.93728	n =	5
	Within		2.34145	.1655496	26.51515	T =	121
Ln(GDP(k))	Overall	24.25458	1.124054	21.95786	26.52217	N =	605
	Between		.03855	24.18926	24.28635	n =	5
	Within		1.123524	21.94091	26.52256	T =	121
Ln(GDP(j)	Overall	24.25396	1.124195	21.95786	26.52217	N =	605
	Between		.0406149	24.18487	24.289	n =	5
	Within		1.123607	21.94112	26.5203	T =	121
Ln(Distance(kj)	Overall	20.30919	.7442868	18.19039	21.55676	N =	605
	Between		0	20.30919	20.30919	n =	5
	Within		.7442868	18.19039	21.55676	T =	121
Language	Overall	.107438	.3099256	0	1	N =	605
	Between		0	.107438	.107438	n =	5
	Within		.3099256	0	1	T =	121
Adjacency	Overall	.3471074	.4764442	0	1	N =	605
	Between		0	.3471074	.3471074	n =	5
	Within		.4764442	0	1	T =	121
Ln(Remoteness(k)	Overall	-14.67551	.4335639	-15.31341	-13.70567	N =	605
	Between		.0191203	-14.7009	-14.64851	n =	5
	Within		.4332259	-15.28801	-13.7135	T =	121
Ln(Remoteness(j)	Overall	-14.67177	.4333988	-15.31341	-13.70567	N =	605
	Between		.0190755	-14.69713	-14.64482	n =	5
	Within		.4330623	-15.28805	-13.71358	T =	121
Ln(Internet(k)	Overall	5.798942	1.133393	2.995732	8.01036	N =	605
	Between		.6771279	4.847821	6.630404	n =	5
	Within		.9576906	3.664332	7.577839	T =	121
Ln(Internet(j)	Overall	5.798942	1.133393	2.995732	8.01036	N =	605
	Between		.6771279	4.847821	6.630404	n =	5
	Within		.9576906	3.6643	7.577839	T =	121

Table 3
Home country bias in transition countries, 1997-2001

Home	**4.21***	**2.57***	**2.92***
	(0.37)	(0.74)	(0.72)
Ln(Distance(kj))	**-0.94***	**-0.54***	**-0.99***
	(0.15)	(0.16)	(0.20)
Ln(GDP(k))	**0.80***	**0.75***	**0.51***
	(0.07)	(0.07)	(0.10)
Ln(GDP(j))	**0.71***	**0.58***	**0.33***
	(0.07)	(0.06)	(0.10)
Adjacency		**1.32***	**1.08***
		(0.24)	(0.24)
Language		**1.44****	**0.62**
		(0.69)	(0.70)
Ln(Remoteness(k))			**1.18***
			(0.30)
Ln(Remoteness(j))			**1.17***
			(0.32)
# Obs	121*5	121*5	121*5
Adj. R^2	0.77, 0.78, 0.75,0.73,0.76	0.80, 0.81, 0.80, 0.79, 0.80	0.81, 0.83, 0.81, 0.80, 0.82
Estimation Method	SUR	SUR	SUR

Notes:*, **, *** denotes statistical significance at 1, 5 and 10 percent levels, respectively
All regressions have year specific intercepts that are not reported here.

Table 4

Influence of Internet on home country bias in transition countries, 1997-2001

Home	**2.89***	**3.90***	**2.84***	**3.648***
	(0.70)	(0.85)	(0.70)	(0.75)
Ln(Distance(kj))	**-1.12***	**-1.07***	**-0.84***	**-0.88***
	(0.20)	(0.187)	(0.20)	(0.20)
Ln(GDP(k))	**0.434***	**0.38***	**0.44***	**0.44***
	(0.10)	(0.95)	(0.09)	(0.087)
Ln(GDP(j))	**0.368***	**0.43***	**0.33***	**0.35***
	(0.10)	(0.96)	(0.09)	(0.088)
Adjacency	**0.904***	**0.95***	**1.14***	**1.33***
	(0.24)	(0.22)	(0.24)	(0.23)
Language	**0.56**	**0.61**	**0.82**	**0.90**
	(0.70)	(0.61)	(0.67)	(0.65)
Ln(Remoteness(k))	**1.56***	**1.56***	**1.22***	**1.22***
	(0.30)	(0.30)	(0.29)	(0.28)
Ln(Remoteness(j))	**1.05***	**0.99***	**1.05***	**0.92***
	(0.34)	(0.32)	(0.31)	(0.30)
Ln(Int(k))	**0.132***	**0.16***		
	(0.05)	(0.052)		
Ln(Int(j))	**-0.11****	**-0.09****		
		(0.052)		
Home*Ln(Int(j))		**--0.17****		
		(0.31)		
Ln(Host(k))			**0.20***	**0.23***
			(0.036)	(0.037)
Ln(Host(j))			**-0.06**	**-0.03**
			(0.036)	(0.037)
Home*Ln(Host(j))				**-0.248***
				(0.10)
# Obs	121*5	121*5	121*5	121*5
Adj. R^2	0.83, 0.84, 0.81, 0.81, 0.82	0.84, 0.84, 0.81, 0.80, 0.82	0.83, 0.84, 0.78, 0.79, 0.81	0.83, 0.84, 0.80, 0.80, 0.81
Estimation Method	SUR	SUR	SUR	SUR

Notes:*, **, *** denotes statistical significance at 1, 5 and 10 percent levels, respectively
All regressions have year specific intercepts that are not reported here.

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