Paper prepared for the 123rd EAAE Seminar

PRICE VOLATILITY AND FARM INCOME STABILISATION

Modelling Outcomes and Assessing Market

and Policy Based Responses

Dublin, February 23-24, 2012

On Trade Impact of Exchange Rate Volatility and Institutional Quality: The Case of Central European Countries

Imre FERTŐ [1] and József FOGARASI [2]

1 Corvinus University of Budapest, Fővám tér 8, H-1093 Budapest, Hungary and Institute of Economics, Hungarian Academy of Sciences, Budaorsi út 45, H-1112 Budapest, Hungary
2 Research Institute of Agricultural Economics, H-1093 Budapest, Zsil u. 3-5, Hungary and Partium Christian University, Faculty of Economics, 27 Primariei, 410209 Oradea, Romania

fogarasi.jozsef@aki.gov.hu

On Trade Impact of Exchange Rate Volatility and Institutional Quality: The Case of Central European Countries

Firstauthor N.M. , Coauthor N. and Othercoauthor N.

Abstract

This paper explores the effect of exchange rate volatility and of the institutional quality on international trade flows of transition economies in Central European Countries by applying a gravity model of balance panel between 1999 and 2008. The results show that nominal exchange rate volatility has had a significant negative effect on trade by applying Psuedo-Maximum-Likelihood (PML) estimator method over this period. The institutional quality need to be improved in case of size of government and the quality of regulation. The negative effect of exchange rate volatility on agricultural exports suggests that joining Central European Countries to the euro zone can reduce the negative effects of exchange rate volatility on trade.

Keywords: international trade, gravity model, exchange rate volatility, institutions.

JEL classification: G10, F11, O17, Q17, P29 .

1. INTRODUCTION

There is a continuously growing body of literature dealing with the effects of exchange rate uncertainty on international trade since the breakdown of the Bretton Woods system of fixed exchange rates when both real and nominal exchange rates have fluctuated widely. Most of the studies are focused on estimating exchange rate volatility effects on international trade of developed countries, especially in the United States (U.S.) as well as on the trade between developed and developing countries. This topic has been neglected in Central and Eastern European Countries (CEEC), despite an expanding body of literature on agricultural trade in the region (e.g. Fertő, 2008; Bojnec and Fertő. 2008; Bojnec and Fertő, 2009) and macroeconomic aspects of the transition (e.g. Bakucs and Fertő, 2005; Bakucs et al., 2007; Bakucs et al., 2009). In addition, the recent economic crisis shed light on the importance of institution explaining trade flows. Empirical papers find evidence supporting a hypothesis that institutions and institutional quality are an important determinant of sectoral export performances (e.g., Blanchard and Kremer, 1997; Berkowitz et al., 2006; Levchenko, 2007; Ranjan and Lee, 2007; Nunn, 2007; Méon and Sekkat, 2008).

The aim of the paper is to analyse the impact of exchange rate volatility and institutional quality on agricultural trade in the CEFTA countries. The article is organised as follows. Section 2 surveys the theoretical and empirical contributions on the exchange rate volatility. In section 3 describes the methodology and data. Section 4 reports the findings of gravity equation estimations. The last section summarises the results and draws some policy implications.

2. LITERATURE REVIEW

The widespread popular perception that greater exchange rate volatility reduces trade has helped to drive monetary union in Europe (European Union Commission, 1990) and is strongly related to currency market intervention by central banks (Bayoumi and Eichengreen, 1998). However, the theoretical and empirical contributions in the literature fail to conclusively support this notion. A number of models have been advanced which support the negative hypothesis that volatility acts to the detriment of international trade while other models have supported the positive hypothesis that exchange rate volatility may lead to grater levels of trade (McKenzie, 1999). Then, inevitably, many empirical studies have failed to establish any significant link between measured exchange rate variability and the volume of trade.

One possible reason for such mixed results is the different time horizons of the analyses. One common argument is that exporters can easily ensure against short-term exchange rate fluctuations through financial markets, while it is much more difficult and expensive to hedge against long-term risk. Peree and Steinherr (1989), Obstfeld (1995), and Cho et al. (2002) presented evidence that longer-term changes in exchange rate seem to have more significant impacts on trade than do short-term exchange rate fluctuations that can be hedged at low cost. On the other hand, Vianne and de Vries (1992) show that even if hedging instruments are available, short-term exchange rate volatility still affects trade because it increases the risk premium in the forward market. Furthermore, Krugman (1989), Wei (1999) and Mundell (2000) argue that hedging is both imperfect and costly as a basis to avoid exchange rate risk, particularly in developing countries and for smaller firms more likely to face liquidity constraints. Pick (1990) analyses the effect of exchange rate risk on United States (U.S.) agricultural trade flows and found that exchange rate risk is not a significant factor affecting bilateral agricultural trade from the U.S. to seven out of eight developed markets, but indicates that exchange rate risk adversely affects U.S. agricultural exports to some developing countries. DeGrauwe (1988) illustrated how the relationship between exchange rate volatility, whether long run or short term, and trade flows is analytically indeterminate when one allows for sufficient flexibility in assumptions.

Another possible reason for such controversial results is the aggregation problem. The effects of exchange rate volatility on export may vary across sectors (McKenzie, 1999). This may occur because the level of competition, the price setting mechanism, the currency contracting, the use of hedging instruments, the economic scale of production units, openness to international trade, and the degree of homogeneity and storability of goods vary among sectors. The differences among sectors in exporters' access to financial instruments, currency contracting, production scale, storability, etc., may be partly pronounced in developing countries. This contrast is only accentuated by the fact that agriculture is typically a notably competitive sector with flexible pricing on relatively short-term contracts. Furthermore, agricultural products are relatively homogenous, and typically less storable than the exports in other sectors (Such, 1974). Therefore Bordo (1980) and Maskus (1986) argue that agricultural

trade may be far more responsive to exchange rate changes than the trade in manufactured products.

Wang and Barett (2007) estimated the impact of the conditional mean and conditional variance of real exchange rates on Taiwan's exports by estimating an innovative rational expectations-based on multivariate GARCH-M model using sector- and destination-specific monthly data. They found that agricultural trade flows are quite significantly negatively affected by high frequency exchange rate volatility that does not seem to impact other sectors significantly. Agriculture appears far more responsive to both expected exchange rates and to expected volatility in the exchange rate and less responsive to importer incomes than do other sectors in Taiwan's economy. Similar results were obtained by Cho et al. (2002) employing gravity models for ten developed countries. They found that real exchange rate uncertainty had a negative effect on agricultural trade over the period between 1974 and 1995. Moreover, the negative impact of uncertainty on agricultural trade has been more significant compared to other sectors.

The available literature dealing with the effect of exchange rate volatility on international trade, focusing on an individual trade commodity, has also found a negative relationship. Sun et al. (2002) estimated the effect of exchange rate volatility on wheat trade worldwide employing a modified gravity-type model. They found that both measures of short-term and long-term exchange rate volatility showed negative effects on world trade, while the long-term effect was even larger. Yuan and Awokuse (2003) analysed the exchange rate volatility and U.S. poultry exports using gravity models with different volatility measures and found that exchange rate volatility has a negative effect on trade in all the three static models and are statistically significant in two of them. Bajpai and Mohanty (2007) found a weak impact of exchange rate volatility on U.S. cotton exports, which could be attributed to the high exposure of the cotton and textile sector to domestic and international policies.

The empirical estimation of the effect of exchange rate volatility on agricultural trade in the literature provided mixed results: the majority of the studies reported a negative impact of exchange rate volatility on trade, but some papers found a positive effect especially in the case of developed countries. This can be possible due to the different time horizon of the investigations and diverse methods of calculating exchange rate volatility

The recent economic crisis shed light on the importance of institution explaining trade flows. Empirical papers find evidence supporting a hypothesis that institutions and institutional quality are important determinants of export performance in different sectors of the economy (e.g. Blanchard and Kremer 1997, Berkovitz et al. 2006, Levchenko 2007, Ranjan and Lee 2007, Nunn 2007, Méon and Sekkat 2008).

3. METHODOLOGY

3.1. The Gravity Equation

Estimating the gravity trade model and assessing trade patterns on the basis of the empirical results has been subject to several econometric challenges. The most recent literature has addressed issues concerning the correct specification and interpretation of the gravity trade equation in empirical estimation. We concentrate on two methodological issues. First, several researches have argued that standard cross-sectional methods yield biased results because they do not control for heterogeneous trading relationships (e.g., Feenstra, 2004; Helpman et al., 2008). Because of this, these researches introduced the fixed effects into the gravity trade equation. The fixed-effect trade models allow for unobserved or misspecified factors that simultaneously explain trade volume between two countries, such as the probability that the countries will be in the same regional integration regime (e.g., Matyas, 1997; Egger, 2002). Although the arguments underlying the use of the fixed effects as a solution to unobserved heterogeneity are roughly the same in the literature, there is little agreement about how to actually specify the fixed effects. Following Cheng and Wall (2005) we apply the fixed effect methods in which country-pair and period dummies are used to reflect the bilateral relationship between trading partners. Second issue is coming from log-linearising the gravity equation, given the heteroscedasticity nature of trade data. To avoid the heteroscedasticity and other estimation issues including, zero values, endogeneity and measurement error Tenreyro (2007) proposes the use Psuedo-Maximum-Likelihood estimator. To deal with heteroscedasticity we apply PML technique.

Traditional gravity trade theory points out that bilateral trade of exporter i and importer j countries in time t ($X_{ij,t}$) is positively associated with their national incomes and negatively associated with their geographical distance (e.g., Anderson and van Wincoop, 2004). We specify the following baseline gravity trade model:

$$\ln EXP_{ijt} = \alpha_0 + \alpha_1 \ln GDP_{jt} + \alpha_2 \ln GDP_{it} + \alpha_3 \ln DIST_{ij} + \alpha_4 \ln XV_{ijt} + \alpha_5 D_1,BOR_{ij} + \alpha_6 D_2,EU + \alpha_7 D_3,CEFTA + \tau_t + \eta_{ijt} \quad (1)$$

where τt's are a full set of year dummies, and ηijt is the error term. Additional factors which may enhance or resist exports are also typically included in equation (1). The most common are dummies for common border, common language and regional trade agreements (RTA). In the equation was included a dummy for common border, D_1,BOR_{ij} with value 1 when country j shares a common border with country i and 0 otherwise, and dummies D_2,EU, D_3,CEFTA for regional trade agreements. Hungary signed a preferential trade agreement with the European Union in 1991 and joined to the Central European Free Trade Agreement (CEFTA) in 1992. D2,EU with value 1 when the country j is member of EU and CEFTA with value 1 when country j is a member of Central European Free Trade Agreement (CEFTA)

states; and otherwise 0. According to the gravity approach we expect positive sign for GDP_{jt}, POP_{jt}, D_1, BOR_{ij}, D_2,EU and D_3,CEFTA, and negative sign for $DIST_{ij}$ variables.

The extended baseline model with institutional quality variables has the following form:

$$\ln EXP_{ijt} = \alpha_0 + \alpha_1 \ln GDP_{jt} + \alpha_2 \ln GDP_{it} + \alpha_3 \ln DIST_{ij} + \alpha_4 \ln XV_{ijt} + \alpha_5 D_1, BOR_{ij} + \alpha_6 D_2, EU + \alpha_7 D_3, CEFTA + \alpha_8 Institution_j + \tau_t + \eta_{ijt} \quad (2)$$

where Institution describes various aspects of the institutional quality like the size of government, the legal system, the access to sound money, the regulation of credit, labour and business, and the freedom to trade (tariffs).

3.2. Data

Economic theory would suggest that the income level of the domestic country should contribute to the determination of a country's exports, and since the marginal propensity to import with respect to income is positive, as well as the expected sign of a nation's trading partner's income should also be positive. The Central European Countries' (Poland, Hungary, Czech Republic, Romania, Slovenia and Slovakia) and export destination countries' income is collected from the World Economic Outlook Database as well as the number of inhabitants (POP) in these countries, while the distance of export destination countries from exporter (i) country is obtained from the CEPII (Mayer and Zignago, 2006). The values of GDP per capita were collected in national currencies and converted to euro at the yearly average exchange rate. The export data of Central European Countries' agricultural products are also expressed in euro and are taken from the EUROSTAT database; there are included one hundred, eighty-one, eighty, fifty-four, forty-four and forty-four export destination countries where Poland, Hungary, Czech Republic, Romania, Slovenia and Slovakia exported agricultural products in every year of the period analysed from 1999 to 2008.

The variables of particular interest are for the level of subjective institutional quality. Our data set includes institutional quality indices produced by the Fraser Institute for institutions (Gwartney and Lawson, 2005). The institutional quality indices are obtained from the 'Economic Freedom of the World' (EFW) database. The EFW institutional quality indices are themselves based on several sub-indices designed to measure the degree of 'economic freedom' in the five areas: (1) government size: expenditures, taxes, and enterprises; (2) legal structure and protection of property rights (legal system); (3) access to sound money: inflation rate, and possibility to own foreign currency bank accounts; (4) freedom to trade internationally: taxes on international trade, regulatory trade barriers, capital market controls, difference between official exchange rate and black market rate and similar (tariff); and (5) regulation of credit, labour, and business. Each economic freedom index ranges from 0 to 10 reflecting the distribution of the underlying data. Notionally, a low value is bad, and a higher value is good. Preliminary analysis shows that all aspects of institutional quality are interrelated, thus the indicators of institutional quality are highly positively correlated. For that reason, we treat them separately in the

empirical analysis, including one dimension of the institutional quality in the equation at a time. Using too many institutional quality indicators simultaneously results in serious problems of multicollinearity.

3.2. Measuring Exchange Rate Volatility

A variety of measures of exchange rate volatility have been used in the literature. Usually, the measures used are some variant on the standard deviation of the difference in annual or quarterly or monthly exchange rates, for example, the standard deviation of the percentage change in the exchange rate or the standard deviation of the first differences in the logarithmic exchange rate. In this article, in order to capture ex-ante exchange rate uncertainty, the latter measure is used. We constructed the measure of exchange rate volatility based on monthly average nominal exchange rates for the period from 1996 to 2008 for every year analysed from the previous three years to year t. The measurement of exchange rate volatility is based on nominal bilateral exchange rates. Several studies highlighted that nominal and real exchange rate series generate very similar empirical results (McKenzie and Brooks, 1997; McKenzie, 1999; Quian and Varanges, 1994).

A moving standard deviation of the first differences in the monthly nominal exchange rate over the forty-eight months (m) prior to the year t and the prior three years (t`) is applied to estimate exchange rate volatility for year t:

$$XVijt = \sqrt{\frac{\sum_{m=1}^{48}\left(x_{ij,m} - \overline{x}_{ij,t`}\right)^2}{48}} \qquad (5)$$

where $x_{ij,m} = \ln e_{ij,m} - \ln e_{ij,m-1}$, $\ln e_{ij,m}$ is the log of the monthly nominal exchange rate (e) between countries i and j at the time (month) m, and $\overline{x}_{ij,m} = \sum_{m=1}^{48} x_{ij,m} / 48$ is the mean of $x_{ij,m}$ over the forty-eight months to year t and the previous three years.

4. RESULTS

This section presents the estimated impact of exchange rate volatility and institutions quality on trade. Table 1 presents the standard estimation outcomes using OLS and PML. The first two columns report OLS estimation using the logarithm of trade as a dependent variable. The regression in the first column captures the importer and exporter specific effects; and the regression in the second column controls for time-varying importer and exporter effects as suggested in Anderson and van Wincoop (2004). The third and fourth columns report PML estimates in order to compare the results with those obtained using OLS. The last two columns differ in that the fourth allows for time-varying importer and exporter effects.

The effect of exchange rate volatility on the trade varies according to the method of estimation. In case of PML estimation applying importer and exporter specific effects model the exchange rate volatility suggests negative effect on trade, while applying time-varying effects model the sign is opposite. However, the coefficients of mass variables of gravity model in case

of importer and exporter specific effects estimations differ significantly from those generated by OLS, they have opposite sign. This suggests that heteroskedasticity can distort the results. OLS significantly exaggerates the role of distance and CEFTA membership, and the exchange rate volatility, exporters' GDP as well as importers' GDP have opposite sign.

Table 1: Exchange rate volatility and exports

	OLS		PML	
Log of distance	-1.039***	-0.812***	-0.015***	-0.263***
Exchange rate volatility	3.915***	7.501***	-3.664**	7.252***
Common border dummy	1.497***	1.821***	1.811***	1.769***
EU membership dummy	0.577***	0.853***	0.837***	1.098***
CEFTA membership dummy	0.451***	0.601***	0.256***	0.308***
EURO area dummy	0.313***	0.363***	0.399***	0.477***
Log of exporters' GDP	-0.333		0.148***	
Log of importers' GDP	0.283***		-0.938***	
Year effect	yes	yes	yes	Yes
Exporters fixed effect	yes	no	yes	No
Importers fixed effect	yes	no	yes	No
N	4030	4030	4030	4030
Adjusted R^2	0.5549	0.3043		
Pseudo R^2			0.8412	0.5122

Notes: N number of observations. ***/**/* statistically significant, respectively at the 1%, 5%, and 10% levels
Source: Authors' estimations.

The Table 2 and Table 3 report the outcome of OLS and PML estimation of the extended model capturing the effects of institutional quality on trade.

Table 2: Exchange rate volatility, institutional quality and exports (OLS)

	Government size	Legal system	Sound money	Regulation	Tariff
Log of distance	-1.012***	-1.051***	-1.055***	-1.036***	-1.089***
Exchange rate volatility	4.109**	4.337**	4.593**	3.744*	4.717**
Common border dummy	1.561***	1.544***	1.546***	1.520***	1.483***
EU membership dummy	0.574***	0.604***	0.592***	0.610***	0.437***
CEFTA membership dummy	0.382***	0.450***	0.445***	0.476***	0.353**
EURO area dummy	0.228*	0.247**	0.252**	0.175	0.311**
Log of exporters' GDP	0.320***	0.325***	0.319***	0.390***	0.255***
Log of importers' GDP	-0.220	-0.300	-0.301	-0.315	-0.164
Institutional quality	-0.102***	0.002	0.017	-0.133***	0.240***
Year effect	yes	yes	yes	yes	yes
Exporters fixed effect	yes	yes	yes	yes	yes
Importers fixed effect	yes	yes	yes	yes	yes
N	4030	4030	4030	4030	4030
Adjusted R^2	0.5810	0.5791	0.5791	0.5802	0.5831

Notes: N number of observations. ***/**/* statistically significant, respectively at the 1%, 5%, and 10% levels
Source: Authors' estimations.

We estimated the effects of institutional quality on trade considering the size of government, the legal system, the development of financial system (sound money), the regulation and tariff and found that in case of both estimation methods, OLS and PML, the size of government and the regulation have negative impact while the financial system, legal system and tariff have positive effect on trade. Considering the effects of institutional quality on trade we can observe the gravity mass variables, the exporters' GDP and importers' GDP, have the same sign when we apply OLS or PML.

Table 3: Exchange rate volatility, institutional quality and exports (PML)

	Government size	Legal system	Sound money	Regulation	Tariff
Log of distance	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
Exchange rate volatility	-4.303*	-4.450*	-6.818**	-4.713**	-5.008**
Common border dummy	1.882***	1.887***	1.880***	1.847***	1.859***
EU membership dummy	0.857***	0.816***	0.945***	0.936***	0.688***
CEFTA membership dummy	0.262**	0.268**	0.320***	0.344***	0.206*
EURO area dummy	0.376***	0.419***	0.363***	0.236***	0.470***
Log of exporters' GDP	0.171***	0.013***	0.002***	0.000***	0.000***
Log of importers' GDP	-0.653**	-0.065**	-0.006**	-0.000**	-0.000**
Institutional quality	-0.052**	0.056*	-0.082**	-0.188***	0.180***
Year effect	yes	yes	yes	yes	yes
Exporters fixed effect	yes	yes	yes	yes	yes
Importers fixed effect	yes	yes	yes	yes	yes
N	4030	4030	4030	4030	4030
Pseudo R^2	0.8592	0.8591	0.8595	0.8601	0.8607

Notes: N number of observations. ***/**/* statistically significant, respectively at the 1%, 5%, and 10% levels
Source: Authors' estimations.

The sign of exchange rate volatility applying PML is opposite from those generated by OLS which suggests that the later estimation method leads to significant bias.

5. CONCLUSIONS

This article has investigated whether exchange rate volatility has negatively affected the agricultural exports and the influence of institutional quality on the international trade of the Central European Countries. We constructed a balanced panel of Polish, Hungarian, Czech, Romanian, Slovenian and Slovakian agri-food exports to their export destination countries for the period 1999-2008. This gave a fairly large panel dataset to which we applied the gravity model specification, which has numerous advantages over cross-sectional studies that have typically been used to highlight the impact of exchange rate volatility on bilateral trade flows. Exchange rate volatility is captured by a moving standard deviation of the first differences in the exchange rate over the forty-eight months nominal average exchange rate of year t and the prior three years.

The estimations of the gravity equation indicate that the signs of significant parameters are according to our expectations, except the effect of exchange rate volatility which varies according to the applied model and estimation method. In case of PML estimation applying importer and exporter specific effects model the effect of exchange rate volatility is negative, while applying time-varying model the variable has positive sign. The positive sign of exchange rate volatility of OLS estimations indicate a significant bias. The coefficient of exchange rate volatility considering the institutional quality is also opposite in case of OLS and PML estimations as we experienced in case of estimating the standard gravity model (regression 1). After solving the heteroskedasticity problem by applying PML estimation method we found in this extended model, that exchange rate volatility has negative effect on trade.

The coefficients of institutional variables indicating the institutional quality have the same signs in both cases using OLS and PML estimation procedures. The estimations indicate that the size of government and the regulation of credit, labor and business have negative impact while the legal system, the financial system and the tariffs have positive effect on trade of agricultural products of Central and Eastern European countries.

The policy implications of the negative effect of exchange rate volatility on the agri-food trade of Central European are connected to the process of joining to the euro zone and to the attitude of agri-food products trading firms. As the exchange rate volatility considering the whole region of the Central European Countries following a different path of transition has a negative effect on trade with agri-food products, the agricultural holdings and firms operating in the food industry are interested to join to the euro zone overcoming of the negative effect of exchange rate volatility. At the same time, trading firms of agri-food products in Central European Countries seems need more financial instruments offered by the forward and futures markets to cover their risks which arise from currency volatility.

The legal system, the financial system and the level of tariffs have positive effects on trade, while governments of the analyzed countries need to take improving actions in case of the size of government and the regulation of credit, labor and business.

ACKNOWLEDGEMENTS

József Fogarasi gratefully acknowledges financial support from the ‘János Bolyai’ scholarship of the Hungarian Academy of Sciences. All opinions expressed are those of the author and have not been endorsed by Hungarian Academy of Sciences.

REFERENCES

Anderson, J. E. and von Wincoop, E. (2004). Trade Costs. *Journal of Economic Literature* 42: 691-751.

Bakucs, L. Z., Falkowski, J.and Fertő, I. (2009). Monetary policy and overshooting of flexible sectors in transition economies: the case of Poland. Conference ‘Macroeconomics and the Agrifood Sector’, Warszawa, Poland.

Bakucs, L. Z., Bojnec, Š. and Fertő, I. (2007). Monetary Impacts and Overshooting of Agricultural Prices: Evidence from Slovenia. 103rd European Association of Agricultural Economists (EAAE) Seminar, Barcelona: EAAE.

Bakucs, L. Z.and Fertő, I. (2005). Monetary Impacts and Overshooting of Agricultural Prices in a Transition Economy. 2005 International Congress of European Association of Agricultural Economists, Copenhagen, Denmark.

Bajpai, S. and Mohanty, S. (2007). Impacts of Exchange Rate Volatility on the U.S. Cotton Export. Southern Agricultural Economics Association (SAEA) Annual Meeting, Dallas: SAEA.

Bayoumi, T.and Eichengreen, B. (1998). Exchange Rate Volatility and Intervention: Implications of the Theory of Optimum Currency Areas. *Journal of International Economics* 45: 191-209.

Berkowitz, D., Moenius, J. and Pistor, K. (2006). Trade, law, and product complexity. *Review of Economics and Statistics* 88: 363–373.

Blanchard, O. and Kremer, M. (1997). Disorganization. *Quarterly Journal of Economics* 112: 1091–1126.

Bojnec, Š. and Fertő, I. (2008). European Enlargement and Agro-Food Trade. *Canadian Journal of Agricultural Economics* 56: 563-579.

Bojnec, Š. and Fertő, I. (2009). Determinants of agro-food trade competition of Central European countries with the European Union. *China Economic Review* 20: 327-333.

Bordo, M. D. (1980). The Effect of Monetary Change on Relative Commodity Prices and the Role of Long-Term Contracts. *Journal of Political Economy* 61: 1088-1109.

Cheng I-H. and Wall H. J. (2005). Controlling for heterogeneity in gravity models of trade and integration. *Federal Reserve Bank of St. Louis Review* 87: 49–63.

Cho, G., Sheldon, I.M. and McCoriston, S. (2002). Exchange Rate Uncertainty and Agricultural Trade. *American Journal of Agricultural Economics* 84: 931-942.

DeGrauwe, P. (1988). Exchange Rate Variability and the Slowdown in Growth of International Trade. *IMF Staff Papers* 35: 63-84.

Egger, H. (2002). International Outsourcing in a Two-Sector Heckscher-Ohlin Model. *Journal of Economic Integration* 17: 687-709.

European Union Commission 1990. One Market, One Money, European Economy. Brussels: EC.

Engle, R. (1982). Autoregressive Conditional Heteroskedasticity with Estimates of the Variance of U.K. Inflation. *Econometrica* 50: 987-1008.

Fenstra, C.R. (2004). Advanced international trade. Princeton: Princeton University Press.

Fertő, I. (2008). The Evolution of Agri-Food Trade Patterns in Central European Countries. *Post-Communist Economies* 20: 1-10.

Frankel, J. A. (1997). Regional Trading Blocs in the World Economic System. Institute for International Economics (IIE), Washington DC: IIE.

Gwartney, J. and Lawson, R. (2005). Economic Freedom of the World: 2005 Annual Report. The Fraser Institute, Vancouver. Data retrieved from www.freetheworld.com.

Helpman, E., Melitz, M. and Rubinstein, Y. (2008). Estimating Trade Flows: Trading Partners and Trading Volumes. *The Quarterly Journal of Economics* 123: 441-487.

Kandilov, I.T. (2008). The Effects of Exchange Rate Volatility on Agricultural Trade. *American Journal of Agricultural Economics* 90: 1028-1043.

Krugman, P. 1989. Exchange Rate Instability. The Lionel Robbins Lectures, Cambridge: MIT Press.

Levchenko, A. (2007). Institutional quality and international trade. *Review of Economic Studies* 74: 791–819.

Maskus, K. E. (1986). Exchange Rate Risk and U.S. Trade. A Sectoral Analysis. *Economic Review. Federal Reserve Bank of Kansas City* 71: 16-28.

Matyas, L. (1997). Proper Econometric Specification of the Gravity Model. *The World Economy* 20: 363-369.

Mayer, T. and Zignago, S. (2006). Notes on CEPII's distance measure. Data retrieved from www.cepii.fr/anglaisgraph/bdd/distances.htm

McKenzie, M. D. (1999). The Impact of Exchange Rate Volatility in International Trade Flows. *Journal of Economic Surveys* 13: 71-106.

McKenzie, M. D. and Brooks, R. (1997). The Impact of Exchange Rate Volatility on German –U.S. Trade Flows. *Journal of International Financial Markets, Institutions, and Money* 7: 73-87.

Méon, P-G. and Sekkat, K. (2008). Institutional quality and trade: which institutions? Which trade?. *Economic Inquiry* 46: 227–240.

Mundell, R. A. (2000). Currency Areas, Exchange Rate Systems, and International Monetary Reform. Journal of *Applied Economics* 3: 217-256.

Nunn, N. (2007). Relationship-specificity, incomplete contracts, and the pattern of trade. *Quarterly Journal of Economics* 122: 569–600.

Obstfeld, M. (1995). International Currency Experience: New Lessons and Lessons Relearned. *Brookings Papers on Economic Activity* 1: 119-196.

Peree, E. and Steinherr, A. (1989). Exchange Rate Uncertainty and Foreign Trade. *European Economic Review* 33: 1241-1264.

Pick, D. H. (1990). Exchange Rate Risk and U.S. Agricultural Trade Flows. *American Journal of Agricultural Economics* 72: 694-700.

Ranjan, P., Lee, J.Y. (2007). Contract enforcement and the volume of international trade in different types of goods. *Economics and Politics* 19: 191–218.

Quian, Y. and Varangis, P. (1994). Does Exchange Rate Volatility Hinder Export Growth? *Empirical Economics* 19: 371-396.

Schuh, G. E. (1974). The Exchange Rate and U.S. Agriculture. *American Journal of Agricultural Economics* 56: 1-13.

Sun, C., Kim, M., Koo, W., Cho, G. and Jin, H. (2002). The Effect of Exchange Rate Volatility on Wheat Trade Worldwide', Annual Meeting of AAEA, Long Beach: AAEA.

Tenreyro, S. (2007). On the Trade Impact of Nominal Exchange Rate Volatility. *Journal of Development Economics* 82, 485-508.

Vianne, J. M. and de Vries, C. G. (1992). International Trade and Exchange Rate Volatility. *European Economic Review* 36: 1311-1321.

Wang, K. L., Barett, C. B. (2007). Estimating the Effects of Exchange Rate Volatility on Export Volumes. *Journal of Agricultural and Resource Economics* 32: 225-255.

Wei, S. J. 1999. Currency Hedging and Goods Trade. *European Economic Review* 43: 1371-1394.

Yuan, Y., Awokuse, T. O. (2003). Exchange Rate Volatility and U.S. Poultry Exports: Evidence from Panel Data', Annual Meeting of AAEA, Montreal: AAEA.