# Exchange Rate Volatility, Euro Effect and the two Margins of Trade: Evidence from Monthly Trade Data


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# I - Introduction

The end of the Bretton Woods system in the early 1970's and the adoption of a floating exchange rate regime in 1973 raised the question of how the resulting increase in exchange rate volatility causes exchange rate risk and affects international trade and welfare. The EMU and the introduction of the Euro, associated with the abolition of several European currencies, led to a huge debate among economists about the effects on trade. Very recently, the global financial crisis as well as the catalyst of the debt crises and the massive central bank interventions especially in Europe and the U.S. have increased exchange rate volatility again and brought the topic back on the agenda.

In the light of the recent events, especially the case of Europe and the Euro is worth a second glance. The question whether joining a currency union and thereby eliminating exchange rate volatility with various other countries is boosting trade significantly is a very relevant question for many Central and Eastern European countries. The fact that countries like Poland postpone their accession to the Euro is a strong indicator for the uncertainty whether or not the negative consequences of a currency union outweigh positive effects, especially on trade.

Early theoretical studies including Clark (1973) and Hooper & Kohlhagen (1978) find negative effects for exchange rate volatility on trade, but are based on strong assumptions. When these assumptions are relaxed, results depend on whether the firms are active in several countries (Makin 1978), adjustments of the inflation rate to exchange rate movements (Cushman 1983; Cushman 1986), flexibility of the firms in adjusting inputs (Canzoneri & Clark 1984) or changing target markets (Broll & Eckwert 1999), risk aversion of the firm (De Grauwe 1988; Viaene & de Vries 1992) or the types of shocks firms are exposed to (Barkoulas et al. 2002).

The empirical literature does not present unambiguous evidence on the relationship between exchange rate volatility and trade. Some studies find significant negative effects (e.g. Chit et al. 2010) or positive effects (e.g. Klein & Shambaugh 2006), but most recent studies do not find a clear effect (e.g. Hondroyiannis et al. 2008; Boug & Fagereng 2010; Eicher & Henn 2011).[1]

1 See literature surveys of Côté (1994), McKenzie (1999), Ozturk (2006), Bahmani-Oskooee & Hegerty (2007) and Auboin & Ruta (2011).

Evidence on currency unions and unilateral dollarization is much clearer. While early studies find large effects and trade to triple (Rose 2000; Frankel & Rose 2002), most recent studies report positive effects on trade of around 5%-30% (e.g. Flam & Nordström 2007; Baldwin & Di Nino 2006; Eicher & Henn 2011). Other authors do not find significant effects (e.g. Berger & Nitsch 2008; Santos Silva & Tenreyro 2010). The usual argument why effects for currency unions are more significant is that a currency union goes beyond the mere elimination of exchange rate variability and lowers transaction costs to a much bigger extent.[2]

Although almost all empirical studies are based on the gravity equation on trade, they differ significantly in methodology, panel of countries, time frame, volatility measure and degree of disaggregation of the trade data.

The aim of this paper is to provide further empirical evidence on the relationship between exchange rate volatility, currency unions in case of the Eurozone and trade by presenting several novelties with respect to previous research. Higher frequency trade and exchange rate data is used to take into account the short term effects of volatility in the bilateral exchange rate. Disaggregated trade data is used to deal with differences among industries.

In contrast to many other studies, several econometric problems including the existence of zero trade values are taken into account. Investigating the impact of exchange rate volatility and the Euro at the same time allows us to disentangle the effect of a common currency beyond the elimination of any variation in the exchange rate with other members. Furthermore, due to a large dataset including very recent data, the developments of the past years with the financial crisis and the EU enlargement to the east is covered, yielding additional findings and policy implications.

Studies investigating the currency union effect by employing early Eurozone data can be assumed to be biased due to the boom in imports in the periphery countries from other Eurozone members that, as we know today, was a consumption and housing bubble that led to what is usually referred to as the European “debt crisis”. Trade effects for the early years, especially for final goods, could have been overestimated.

2 Baldwin (2006) provides a good overview on the early literature.

The rest of the paper is structured as follows: Section II describes the empirical strategy and issues in the estimation. Section III presents the main results and finally, section IV concludes with a summary of the main findings and some policy implications.

# II - Methodology

The empirical analysis is based on the standard gravity model of trade that was first developed by Tinbergen (1962). It is based on Newton's law of universal gravitation, according to which planets are mutually attracted in proportion to their physical mass and proximity. Transferred to the world of trade, physical mass is replaced with economic mass which is usually measured in GDP. Thus, trade between two countries is modelled as a function of their "economic mass" and the distance between them and has the following form:

$$X_{ij} = G A_i B_j \phi_{ij} \quad , \quad (1)$$

where $X_{ij}$ denotes the monetary value of exports from i to j, $A_i$ comprises all exporter and $B_j$ all importer specific factors that make up the total production capacity and demand. G is a variable that does not depend on i or j such as the level of world liberalization. Finally, $\phi_{ij}$ represents the ease of exporter i to access of market j what is the inverse of bilateral trade costs.

## II.I - Estimation Issues

The gravity equation of trade has seen numerous contributions and further developments in the past years. In particular the work of Anderson & van Wincoop (2003) has been very influential. They show that for a well specified gravity equation trade costs must be seen in relative terms to the rest of the world in order to model a countries overall "resistance" to trade. This can be done by introducing "multilateral trade-resistance" (MTR) in the gravity equation. The basic idea is that ceteris paribus two countries trade less with each other when they are surrounded by big economies than if they are surrounded by water, mountains or deserts and that the standard gravity equation does not account for that.

We are dealing with MTR by introducing country-year dummies that control for time-varying exporter and importer effects. Because GDP variables for exporter and importer, usually employed in the gravity model to measure economic mass, vary only by year and country, we use the log of the cross-product of GDP instead.

Another serious issue, especially when dealing with sectoral trade flows or trade between small countries, is the existence of zero trade flows. While previous models were not capable of explaining the existence of zeros in trade flows and treated them as missing data, the monopolistic-competition model of heterogeneous firms developed by Melitz (2003) explains their existence with differences in productivity between firms. Helpman et al. (2008) specified a model that allows to control for zero trade flows with a two-stage procedure. In the first stage, the extent of firms' entry into an export market (extensive margin), which is an unobserved variable in the standard gravity equation, is estimated using a Probit model given by:

$$\rho_{ij} = Pr(T_{ij} = 1) = \Theta(y_0 + \nu_i + \sigma_j + \kappa VC_{ij} + \zeta FC_{ij}) \quad , \qquad (2)$$

where the probability of exports from i to j depends on the importer and exporter dummies $\nu_i$ and $\sigma_j$, bilateral variable exporting costs $VC_{ij}$ and fixed costs of entry $FC_{ij}$.

In the second stage the determinants of trade flows (in monetary value) are estimated with an augmented version of the gravity equation where the results of the first stage in form of the Inverse Mill's Ratio (IMR) are used to control for the sample selection bias due to omitted zero trade flows. Following this approach, the equation then is:

$$X_{ij} = \beta_0 + I_i + I_j + \kappa VC_{ij} + \ln(e^{\delta(z_{ij} + \eta_{ij})} - 1) + \beta_\eta \eta_{ij} + e_{ij} \quad , \qquad (3)$$

where trade flows between i and j is the dependent variable and $I_i$ and $I_j$ denote the exporter and importer individual effects. The term in brackets is the share of firms that export to j, z is the fitted variable for the latent variable that was estimated in the first stage and $\eta_{ij}$ is the Inverse Mill's Ratio.

A requirement of the approach is an exclusion restriction: one variable that enters the first stage but not the second and that has no significant impact on the trade value, but on the probability to export.

Most authors choose a dummy whether or not to countries share the same religion as the excluded variable. In the European context, we do not consider this a good choice, as all countries share a christian heritage and only some of their trading partners differ from that[3]. Also the main religion of a specific country does usually not vary over time.

3 Namely China, India and Turkey.

In this specific case of the EU members, we assume the crossproduct of the time varying measures of corruption for exporter and importer to be appropriate. The channel through which it affects trade is by rising insecurity and associated extra fixed costs for the exporting firm stemming from a higher probability of authorities or criminals trying to extort bribes in their homeland or export destination (Crozet et al. 2008).

For firms in countries with very low levels of corruption, this can be seen as a serious obstacle to start exporting as those countries are usually not used to this practices. But also positive effects for trade are conceivable: corrupt officials might allow firms to export or import even if their products do not meet technical, ethical, quality or safety standards. In overregulated countries this could lower fixed trade costs significantly (Rose-Ackerman 1999). Either way, by influencing fixed-costs rather than variable costs, corruption can be thought of as an additional barrier to trade, which should not have a significant impact on the value of trade once firms learn how to operate in a corrupt environment.

The corruption data is taken from the International Country Risk Guide (ICRG) published by the PRS Group and is a component of the Political Risk Dataset. It has a scale from 0 (extremely high level of corruption) to 6 and assesses corruption within the political system[4].

An additional possible source of estimation bias is the endogeneity of the decision to join a currency union. Frankel (2008) argues that endogeneity was not responsible for the extremely high estimates of early studies investigating currency union effects on trade. He presents estimates of similar magnitude to those found by a large number of early studies for the CFA zone, whose members have not decided to peg their currency to the Euro, but did so after France joined the Eurozone. The peg was not accompanied by other steps of integration that may have boosted trade and stands for an interesting natural experiment as the currency decision can be seen as exogenous.

In our case we assume endogeneity of the currency decision not to be a serious issue as past integration steps for Eurozone members are controlled for with a dummy for membership in the European Union (EU). Besides the common currency, Eurozone members have the same degree of trade facilitating integration as members of the EU. We assume that the decision to join the

4 In our dataset the crossproduct for both countries ranges from 2 to 36.

Eurozone is a political decision that is mostly driven by other factors different from those influencing the value of trade.

## II.II - Data

We have build a dataset with monthly bilateral trade for 35 countries over the period from January 1996 to December 2010. The countries included are all EU-27 countries and their mayor trading partners (Table 1).[5] We use nominal monthly bilateral trade data disaggregated according to the BEC classification[6] from Eurostat. Unfortunately, Eurostat does not contain data on bilateral trade between two non-EU members, therefore data on trade flows between countries that have never been members of the EU is missing. The share of total trade covered by our sample is for EU countries well over 80% (Table 3).

We assign the BEC sectors to three categories of goods, namely capital goods, intermediates and final goods, as recommended by the United Nations Department of Economic and Social Affairs (2007) (Table 2). The share for each BEC category in total trade for the whole sample is illustrated in Figure 1 and the evolution over time of total trade for our three categories in Figure 2.

Nominal GDP data is taken from the World Development Indicators database (WDI) at an annual level. To construct the bilateral exchange rates[7] and the volatility measure, we use Daily nominal middle exchange rates reported by Datastream from the WM Company/Reuters.[8]

Different measures of exchange rate volatility have been proposed in the related literature. Most approaches have in common to measure the variance, but differ in the implementation. Examples are the standard deviation of a rate of change or the moving standard deviation. Other measures, like ARCH and GARCH models, have gained popularity among researchers in recent years. The latter model the variance of the disturbance term for each period as a function of the errors in the previous periods. All measures have drawbacks, like for instance the high persistence of real exchange rate shocks when moving average representations are applied, or low correlation in volatility when ARCH/GARCH models are the measure of choice (Baum et al. 2004). The introduction of new and more sophisticated measures has however not changed the results

5 Data for Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Luxembourg, Malta, Poland, Romania, Slovakia and Slovenia is missing for the years from 1996 to 1998.

6 A thorough description of the BEC classification is available from the United Nations Department of Economic and Social Affairs (2007).

7 The bilateral exchange rate measure is the average exchange rate of the past six months.

8 This rate is the midpoint between the bid rate and the offered rate.

significantly in the empirical literature on the impact of exchange rate volatility on trade (Ćorić & Pugh 2010).

Another important question is whether the volatility of the nominal or the real exchange rate or both are included in the model. An advantage of the real exchange rate is, that it captures the true relative price of the good, however it also captures variation in the price levels, what is not desirable. Many studies use both exchange rates and compare the results. The differences they find are usually very small.[9]

Based on the recent literature, we have selected the standard deviation of the first difference of the logarithms of the nominal exchange rate, which has been used in various studies before (e.g. Clark et al. (2004)):

$$Volatility_{ijt} = Std.\,dev.[\ln(e_{ijt,d}) - \ln(e_{ijt-1})] \qquad d = 1...130 \quad , \qquad (4)$$

where e denotes the daily bilateral exchange rate between countries i and j at business day t.

This measure has the advantage of being equal to zero when the exchange rate is on a consistent trend, which apparently could be forecasted and consequently would not be a source of uncertainty.

To avoid bias from changes in price levels via spurious correlation, we use nominal exchange rates. The measure is constructed as a short-term volatility measure with bilateral exchange rates from the past six months. Departing from most previous studies, we construct the exchange rate volatility measure with daily exchange rates which allow more precise measures than "end of the month" values, as exchange rates sometimes tend to suffer more extreme movements at the end of each month. High persistence of exchange rate shocks is less of a problem as we only measure very short-term volatility of the past six months with high frequency data. In contrast to studies investigating long- or mid-run volatility, we investigate the effect of short term exchange rate volatility on trade by using a 6-month volatility measure. We assume that 6 months have 130 business days and thus construct the volatility measure accordingly.

9 A very profound comparison of the effects real and nominal exchange rate volatility on exports was conducted by Cotter & Bredin (2011) finding that magnitude and direction are not changing, while timing effects can be different.

# III - Effect of Exchange Rate Volatility on Trade

Estimations are conducted for three different categories of products: capital goods, intermediates and consumption goods. The idea is that these three groups differ significantly in terms of contracting patterns and that our variables of interest might affect trade flows in a different direction or to a different extent.

## III.I - Model Specification

First, we are conducting FE and RE regressions with year-varying country fixed effects on the log of the value of bilateral exports. Therefore, we are estimating the following equation:

$$\begin{aligned}\ln X_{ijkt} = {} & \beta_0 + \beta_1 \ln\left(Y_{it} * Y_{jt}\right) + \beta_2 \ln Distance_{ij} + \beta_3 EU_{ijt} + \beta_4 Euro_{ijt} + \\ & \beta_5 Border_{ij} + \beta_6 Language_{ij} + \beta_7 Landlocked_{ij} + \beta_8 Island_{ij} + \beta_9 Colony_{ij} + \\ & \beta_{10} Volatility_{ijt} + \beta_{11} \ln ExRate_{ijt} + \beta_{12} Corruption_{ijt} + \kappa_k + \lambda_m + \alpha_{iy} + \nu_{jy} + \varepsilon_{ijkt}\end{aligned} \quad , (5)$$

where the explained variable $X_{ijkt}$ denotes nominal exports in sector k from the reporter country i to the partner country j at time t (month m in year y). The independent variable $\kappa_k$ controls for industry differences with dummy variables for each BEC category and $\lambda_m$ controls for monthly seasonal effects with dummy variables for each month m of the year y. The introduction of $\alpha_{iy}$ and $\nu_{jy}$ proxies for multilateral resistance.

The simultaneous inclusion of the measure of nominal exchange rate volatility and the dummy variable for mutual Euro membership allows us to capture convex effects as described by Baldwin (2006). Other variables are described in Table 4.

In order to control for zero trade flows we are following the two stage approach from Helpman et al. (2008). The first step estimation then is a probit regression on the probability to export:

$$\begin{aligned}Pr\left(X_{ijkt} = 1\right) = \Theta\big(\beta_0 + \beta_1 \ln Y_{it} * Y_{jt} + \beta_2 \ln Distance_{ij} + \beta_3 EU_{ijt} + \beta_4 Euro_{ijt} + \\ \beta_5 Border_{ij} + \beta_6 Language_{ij} + \beta_7 Landlocked_{ij} + \beta_8 Island_{ij} + \beta_9 Colony_{ij} + \\ \beta_{10} Volatility_{ijt} + \beta_{11} \ln ExRate_{ijt} + \beta_{12} Corruption_{ijt} + \kappa_k + \lambda_m + \alpha_i + \nu_j\big)\end{aligned} \quad , (6)$$

The second step is then estimated as a FE and RE regression including the linear prediction of exports down-weighted by its standard error (ZHAT) and the Inverse Mills Ratio (IMR). To fulfil the exclusion restriction, the variable $Corruption_{ijt}$ is not included:

$$\ln X_{ijkt} = \beta_0 + \beta_1 \ln(Y_{it} * Y_{jt}) + \beta_2 \ln Distance_{ij} + \beta_3 EU_{ijt} + \beta_4 Euro_{ijt} + \beta_5 Border_{ij} + \beta_6 Language_{ij} + \beta_7 Landlocked_{ij} + \beta_8 Island_{ij} + \beta_9 Colony_{ij} + \beta_{10} Volatility_{ijt} + \beta_{11} \ln ExRate_{ijt} + \beta_{12} ZHAT + \beta_{13} IMR + \kappa_k + \lambda_m + \alpha_{iy} + \nu_{jy} + \varepsilon_{ijkt} \quad . (7)$$

## III.II - Results

The extended gravity model is estimated for a sample of 35 countries over 15 years. Table 5 to 7 present the results for capital goods, intermediates and final goods separately.

The results show very robust negative effects for the volatility measure for the current period and for all lags. While for final goods (Table 7) the effect is higher for the current value of the volatility variable than for the rest, for capital goods (Table 5) lags of the volatility variable present higher coefficients than the current value. Finally, for intermediates (Table 6) the current value and the first lag show higher elasticities than the second and third lags.

Mutual EU membership has a significant positive effect on the probability to trade and the trade value. The coefficient of the EU dummy in the probit model is positive and statistically significant and range from 0.26 for capital goods over 0.34 for intermediates to 0.44 for final goods (Column 3 in Table 5 to 7). Thus, mutual EU membership increases the extensive margin of trade significantly, especially for industries producing final goods (Table 7).

The estimated coefficient for EU membership in the FE model, which should give an idea of the effect of EU membership on the intensive margin equals 0.09 for intermediate goods (Table 6, column 4), about 0.11 for capital goods (Table 5, column 4) and 0.2 for final goods (Table 7, column 4). Hence, the highest EU effect is found for final goods.

The results for the Euro effect are more ambiguous than for the EU effect, but still significant at conventional levels. The probability to trade is negatively affected with estimated coefficients around -0.25 for final goods and intermediates and -0.33 for capital goods. Trade value is affected negatively for capital goods with estimates around -0.10 and positively with estimates around 0.08 and 0.07 for intermediates and final goods, respectively.

In percentage points, the impact of the Euro on trade values lies according to our estimations at around 9% for intermediates and 7% for final goods. When not controlling for exchange rate

volatility, the impact of the Euro on exports rises only slightly. For capital goods trade is around 11% lower and around 8% in the two stage approach.

When estimating the model excluding exchange rate movements, the estimated coefficients remain almost unchanged, whereas exchange rate volatility coefficients move slightly. Not controlling for exchange rate volatility leads to slightly higher estimates for the EU and Euro dummy (Table 8-10).

All coefficients of the other variables included in the gravity equation yield the expected signs for the standard variables. Estimates are always significant and positive for the GDP cross product and negative and significant for the distance between capitals. Controls for contiguity always yield significant positive estimates and the coefficient of the variable island is negative and significant. While the control variable for common official language shows mixed results, former colonial ties have a negative impact on the probability to export, but a positive on the value exported.

The excluded variable in the second stage that, which is expected to have an impact only on the probability to trade, but not on the value, does a considerably good job. Our bilateral corruption measure has an insignificant impact on trade value and a significant impact on the probability. Only for capital goods, the impact on the value was significant, but very low.

When testing our results for robustness, we find that neither reducing the time period (Table 12, column 1-3), nor excluding big non-European countries (Table 12, columns 4-6) from the sample significantly changes results for the EU or Euro dummies. Nevertheless, the volatility variables turn out to be less significant and their general impact less clear-cut. This is due to the fact that exchange rates in the full sample are more volatility before 1999 for countries that later joined the Euro and in general between EU-countries and countries with more or less free floating exchange rates like U.S., Russia or India.

## IV - Conclusion and Policy Implications

In contrast to many previous studies, we do not find unambiguous results for exchange rate volatility. Instead, we find evidence for a significant negative impact, admittedly small in size. We find that sectors react differently with regard to the time frame and size of the impact. While mutual EU membership promotes trade via the extensive and intensive margin for most goods,

Euro membership does so only via the intensive margin and not for capital goods. This could provide some evidence for a pronounced specialization process taking place in the Eurozone at the industry level after the introduction of the Euro, which results in countries exporting goods from less industries, but higher overall value. According to our results, the effect is slightly stronger for intermediates than for final goods. However, further research is needed to confirm this statement.

The results for the extensive margin are very much in contrast to findings obtained by other authors (e.g. Bergin & Lin 2010; Baldwin & Di Nino 2006), who usually find positive Euro effects on the extensive margin. This is probably due to the lower level of disaggregation and higher frequency of our trade data. Negative effects on a monthly level do not necessarily mean that positive effects on a yearly and product level are not possible. It would mean that while the Euro forced a strong specialization process with pronounced seasonality on the industry level, the number of different products traded between members of the Eurozone on a yearly basis has increased.

The introduction of controls for firm heterogeneity and sample selection bias does not change the results. Nonetheless, extensive and intensive margin are affected very differently by our variables of interest. When dropping most observations with higher volatility from the sample, the impact of exchange volatility on trade is less clear while the impact of mutual EU and Euro membership remains robust.

Policy implications stemming from our results are manifold. Policymakers should keep in mind, that currency unions come at great costs with regard to the flexibility of the domestic monetary policy and positive trade effects may be very limited and do not exist for all types of goods. The elimination of exchange rate volatility can also be achieved by a fixed peg. Although we find trade effects to be small, it still may be the best choice to avoid negative impacts as experienced currently in Eurozone and grants greater flexibility.

The question whether stabilizing the exchange rate is a desirable objective for policymakers is unclear and it is also unclear to which extent the real exchange rate is a variable that policymakers should be able to influence or actually can influence, besides establishing a currency union, a fixed peg or Dollarization (Eichengreen 2007; Rodrik 2008).

In the light of the current economic and political crisis in Europe, our results provide evidence that a common currency may reduce investments and thus trade in capital goods within the currency union. Together with other imbalances, like current account imbalances or real exchange rate misalignments, this may lead to a loss in competitiveness that can not be compensated by a devaluation of the domestic currency by a single member.

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# Appendix

**Figure 1: Share of Total Exports by BEC Category, 1996-2010**

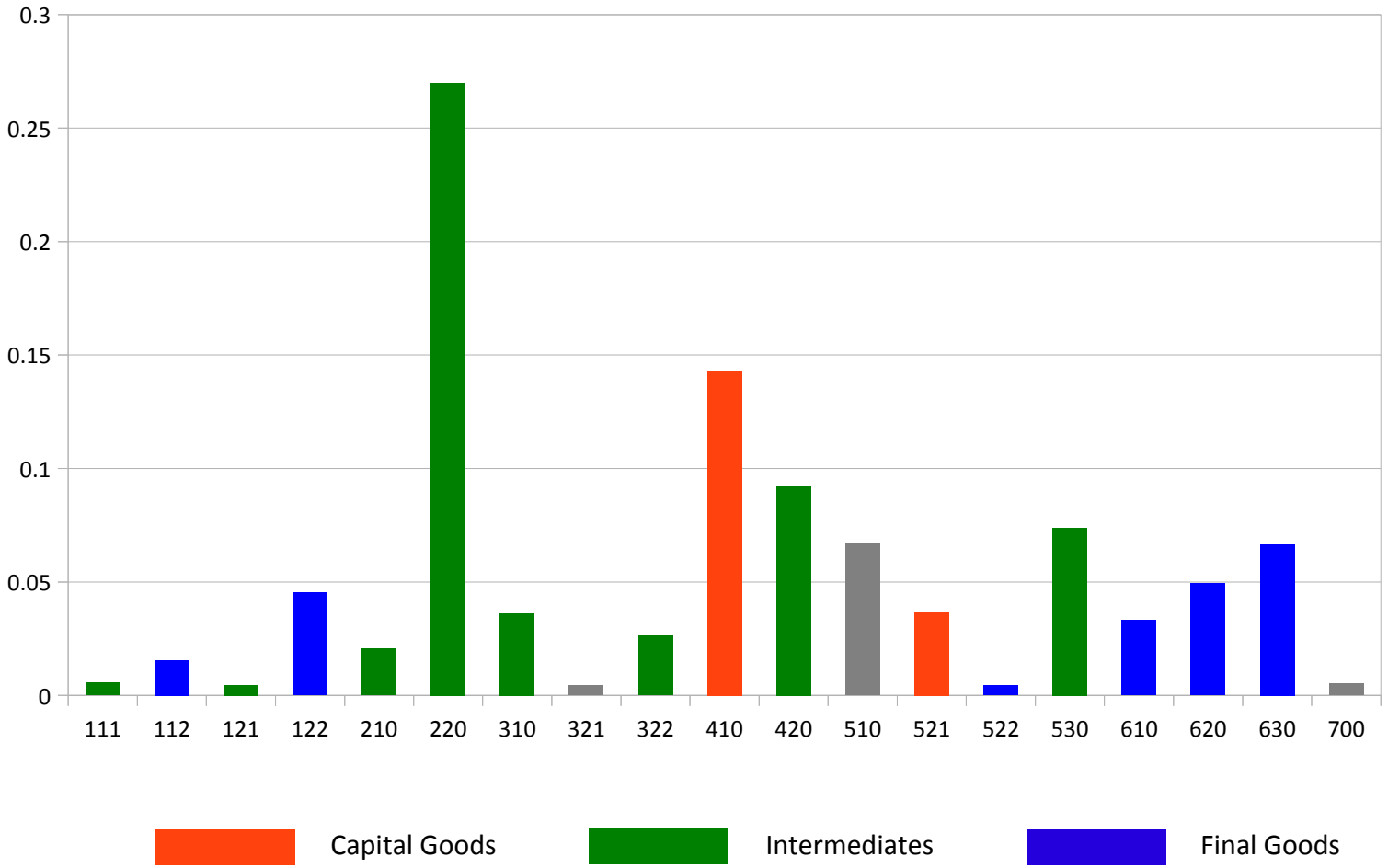

**Figure 2: Log of Total Trade Value**

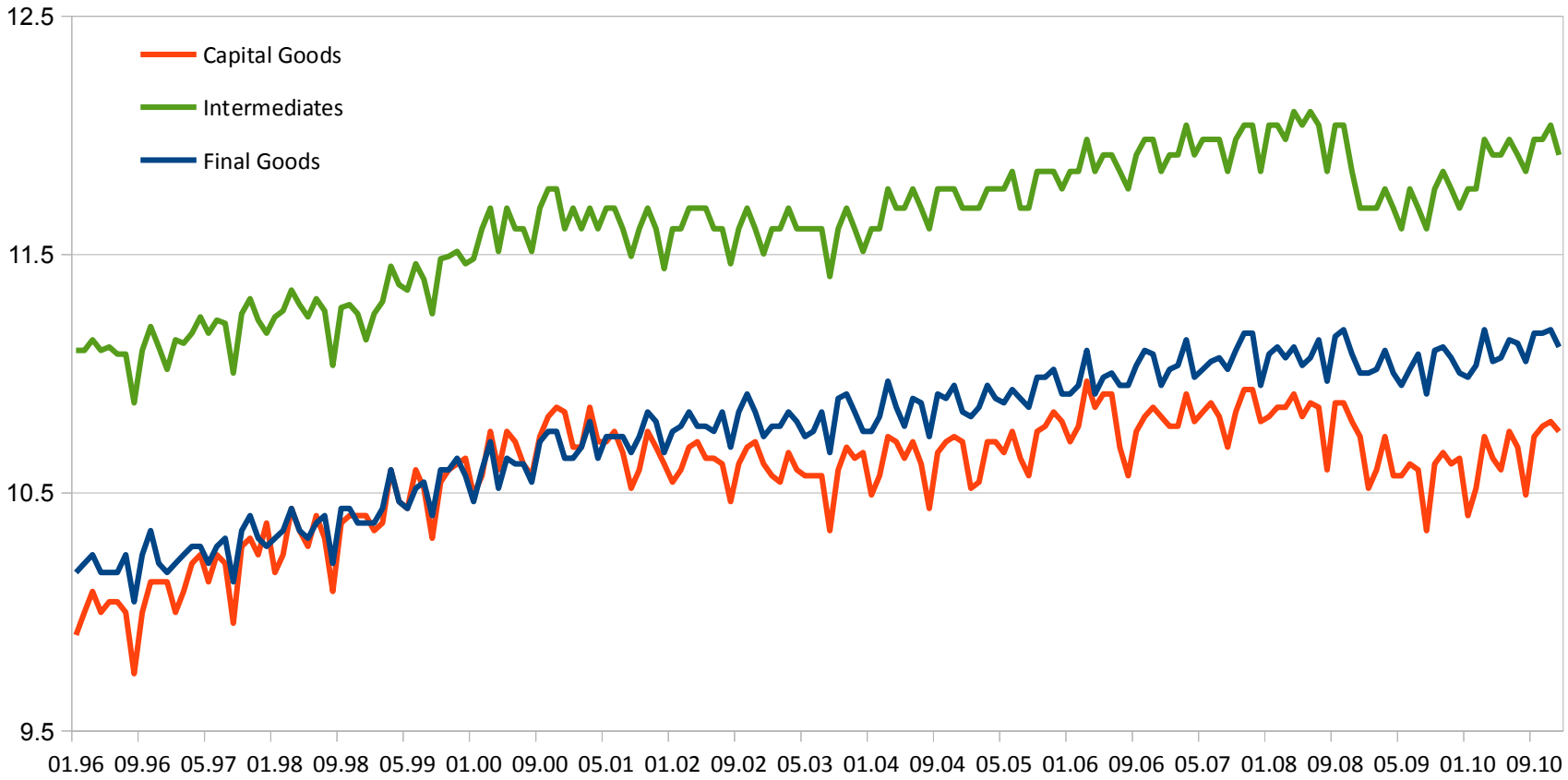

**Table 1: Coverage**

| Countries | | | | |
|---|---|---|---|---|
| Austria | Estonia | Ireland | Netherlands | Slovenia |
| Belgium | Finland | Italy | *Norway* | Spain |
| Bulgaria | France | *Japan* | Poland | Sweden |
| Cyprus | Germany | Latvia | Portugal | *Switzerland* |
| *China* | Greece | Lithuania | Romania | *Turkey* |
| Czech Republic | Hungary | Luxembourg | *Russia* | United Kingdom |
| Denmark | *India* | Malta | Slovakia | *USA* |

*Non-EU members in italic letters.*

**Table 2: BEC Categories**

| BEC Code | Description |
|---|---|
| 111[2] | Food and beverages / primary / mainly for industry |
| 112[3] | Food and beverages / primary / mainly for household consumption |
| 121[2] | Food and beverages / processed / mainly for industry |
| 122[3] | Food and beverages / processed / mainly for household consumption |
| 210[2] | Industrial supplies n.e.s. / primary |
| 220[2] | Industrial supplies n.e.s. / processed |
| 310[2] | Fuels and lubricants / primary |
| 321 | Fuels and lubricants / processed / motor spirit |
| 322[2] | Fuels and lubricants / processed / other |
| 410[1] | Capital goods (except transport equipment) |
| 420[2] | Capital goods / parts and accessories |
| 510 | Transport equipment and parts and accessories thereof / passenger motor cars |
| 521[1] | Transport equipment and parts and accessories thereof / other / industrial |
| 522[3] | Transport equipment and parts and accessories thereof / other / non-industrial |
| 530[2] | Transport equipment and parts and accessories thereof / parts and accessor. |
| 610[3] | Consumer goods n.e.s. / durable |
| 620[3] | Consumer goods n.e.s. / semi-durable |
| 630[3] | Consumer goods n.e.s. / non-durable |
| 700 | Goods not elsewhere specified |

Superscript denotes whether the category is [1] capital, [2] intermediate or [3] consumption good.

**Table 3: Share of Total Trade in the Sample**

| Eurozone | | Other EU-Members | | Non-EU Members | |
|---|---|---|---|---|---|
| **Country** | **Share in %** | **Country** | **Share in %** | **Country** | **Share in %** |
| Austria | 87.07 | Bulgaria | 78.41 | Switzerland | 69.75 |
| Belgium | 91.62 | Czech Republic | 93.51 | China | 15.80 |
| Cyprus | 61.66 | Denmark | 83.75 | India | 19.60 |
| Germany | 80.58 | Estonia | 91.73 | Japan | 13.36 |
| Spain | 82.00 | United Kingdom | 82.91 | Norway | 72.39 |
| Finland | 85.16 | Hungary | 88.48 | Russia | 32.52 |
| France | 84.09 | Lithuania | 88.77 | Turkey | 49.57 |
| Greece | 71.01 | Latvia | 90.86 | USA | 19.04 |
| Ireland | 90.62 | Poland | 88.74 | | |
| Italy | 80.78 | Romania | 85.09 | | |
| Luxemburg | 96.18 | Sweden | 87.93 | | |
| Malta | 64.49 | | | | |
| Netherlands | 88.28 | | | | |
| Portugal | 86.63 | | | | |
| Slovakia | 93.69 | | | | |
| Slovenia | 72.39 | | | | |

*Notes*: Share is the average share of total trade value covered by our sample over all 16 BEC categories and 15 years for a single country.

**Table 4: Variables**

| Variable | Description | Source |
|---|---|---|
| $\ln X_{ijkt}$ | Log of exports of good k from country i to j at time t in US$ | Eurostat |
| $\ln Y_{ijt}$ | Log of the cross-product of nominal GDP of the countries i and j at time t in US$ | CEPII |
| $\ln Dist_{ij}$ | Log of distance between capitals of country i and j in km | CEPII |
| $EU_{ijt}$ | Dummy whether (1) or not (0) the countries i and j are both members of the EU at time t | CIA World Factbook 2011 |
| $Euro_{ijt}$ | Dummy whether (1) or not (0) the countries i and j have the Euro as a common currency and time t | CIA World Factbook 2011 |
| $Border_{ij}$ | Dummy whether (1) or not (0) the countries i and j share a common border | CEPII |
| $Language_{ij}$ | Dummy whether (1) or not (0) the countries i and j share a common official language | CEPII |
| $Landlocked_{ij}$ | Dummy whether none (0), one of the countries i and j (1), or both (2) are landlocked | CIA World Factbook 2011 |
| $Island_{ij}$ | Dummy whether none (0), one of the countries i and j (1), or both (2) are on an island | CIA World Factbook 2011 |
| $Colony_{ij}$ | Dummy whether (1) or not (0) the the countries i and j ever had a colonial link | CEPII |
| $Volatility_{ijt}$ | Bilateral volatility measure of the nominal exchange rate of the countries i and j at time t | WM Company/Reuters |
| $\ln Exch.\ Rate_{ijt}$ | Log of the bilateral nominal exchange rate of the countries i and j at time t | WM Company/Reuters |
| $Corruption_{ijt}$ | Cross-product of the corruption measure of countries i and j at time t | International Country Risk Guide (ICRG) |

**Table 5: Regression Results - Capital Goods**

| | | | 1st Step | 2nd Step | 2nd Step |
|---|---|---|---|---|---|
| | **FE** | **RE** | **Probit** | **FE** | **RE** |
| **ln GDP**$_{ijt}$ | 0.447*** | 0.474*** | 0.462*** | 0.243*** | 0.467*** |
| | (0.0395) | (0.0128) | (0.00222) | (0.0402) | (0.0127) |
| **ln Distance**$_{ij}$ | - | -1.206*** | -0.861*** | - | -1.206*** |
| | | (0.0543) | (0.00653) | | (0.0540) |
| **EU**$_{ijt}$ | 0.115*** | 0.112*** | 0.260*** | 0.122*** | 0.118*** |
| | (0.0161) | (0.0161) | (0.0103) | (0.0161) | (0.0161) |
| **Euro**$_{ijt}$ | -0.114*** | -0.104*** | -0.331*** | -0.0708*** | -0.0815*** |
| | (0.0207) | (0.0204) | (0.0141) | (0.0214) | (0.0210) |
| **Border**$_{ij}$ | - | 0.606*** | 1.041*** | - | 0.659*** |
| | | (0.0976) | (0.0337) | | (0.0984) |
| **Language**$_{ij}$ | - | 0.194* | 0.0408* | - | 0.207* |
| | | (0.112) | (0.0243) | | (0.112) |
| **Colony**$_{ij}$ | - | 0.539*** | -0.138*** | - | 0.578*** |
| | | (0.118) | (0.0281) | | (0.118) |
| **Island**$_{i}$ | - | -0.698*** | -0.247*** | - | -0.723*** |
| | | (0.195) | (0.00772) | | (0.194) |
| **Landlocked**$_{i}$ | - | -1.989*** | -0.0988*** | - | -2.004*** |
| | | (0.251) | (0.00744) | | (0.250) |
| **Volatility**$_{ijt}$ | -2.805*** | -2.758*** | -1.688*** | -1.518*** | -2.231*** |
| | (0.514) | (0.515) | (0.368) | (0.545) | (0.542) |
| **L1.Volatility**$_{ijt}$ | -3.482*** | -3.432*** | -1.475*** | -2.200*** | -2.885*** |
| | (0.612) | (0.614) | (0.363) | (0.638) | (0.636) |
| **L2.Volatility**$_{ijt}$ | -3.527*** | -3.425*** | -1.430*** | -2.244*** | -2.901*** |
| | (0.509) | (0.510) | (0.358) | (0.540) | (0.537) |
| **L3.Volatility**$_{ijt}$ | -1.451*** | -1.402*** | -1.555*** | -0.164 | -0.735 |
| | (0.531) | (0.533) | (0.364) | (0.559) | (0.556) |
| **ln ExRate**$_{ijt}$ | -0.301*** | -0.296*** | -0.00373 | -0.299*** | -0.295*** |
| | (0.0710) | (0.0712) | (0.0501) | (0.0709) | (0.0712) |
| **ln L1.ExRate**$_{ijt}$ | 0.0500 | 0.0578 | -0.0924 | 0.0500 | 0.0571 |
| | (0.0634) | (0.0636) | (0.0840) | (0.0634) | (0.0636) |
| **ln L2.ExRate**$_{ijt}$ | 0.271*** | 0.240*** | -0.0426 | 0.271*** | 0.241*** |
| | (0.0734) | (0.0732) | (0.0816) | (0.0734) | (0.0732) |
| **ln L3.ExRate**$_{ijt}$ | 0.0826 | 0.0751 | 0.0656 | 0.0804 | 0.0733 |
| | (0.0547) | (0.0549) | (0.0471) | (0.0547) | (0.0548) |
| **Corruption**$_{ijt}$ | -0.0089*** | -0.0088*** | 0.0156*** | - | - |
| | (0.00308) | (0.00304) | (0.000661) | | |
| **Zhat** | - | - | - | 0.0088*** | 0.0048*** |
| | | | | (0.00118) | (0.00109) |
| **IMR** | - | - | - | 2.047*** | 5.926*** |
| | | | | (0.631) | (0.509) |
| **Obs.** | 283,895 | 283,895 | 345,268 | 283,895 | 283,895 |
| **$R^2$** | 0.194 | 0.697 | - | 0.194 | 0.698 |
| **RMSE** | 1.171 | 1.176 | - | 1.171 | 1.175 |

Standard errors in parentheses; significance levels: * 10% ** 5% ***1%

Reported $R^2$ is within $R^2$ for FE estimations and overall $R^2$ for RE estimations.

**Table 6: Regression Results - Intermediates**

| | | | 1st Step | 2nd Step | 2nd Step |
|---|---|---|---|---|---|
| | **FE** | **RE** | **Probit** | **FE** | **RE** |
| **ln GDP**$_{ijt}$ | 0.682*** | 0.510*** | 0.390*** | 0.660*** | 0.516*** |
| | (0.0179) | (0.0105) | (0.000915) | (0.0143) | (0.0105) |
| **ln Distance**$_{ij}$ | - | -1.544*** | -0.708*** | - | -1.562*** |
| | | (0.0489) | (0.00278) | | (0.0488) |
| **EU**$_{ijt}$ | 0.0896*** | 0.0873*** | 0.341*** | 0.0912*** | 0.0890*** |
| | (0.00902) | (0.00901) | (0.00449) | (0.00900) | (0.00900) |
| **Euro**$_{ijt}$ | 0.0942*** | 0.0894*** | -0.257*** | 0.0785*** | 0.0705*** |
| | (0.0116) | (0.0115) | (0.00613) | (0.0120) | (0.0119) |
| **Border**$_{ij}$ | - | 1.147*** | 1.096*** | - | 1.107*** |
| | | (0.0879) | (0.0125) | | (0.0878) |
| **Language**$_{ij}$ | - | 0.0904 | 0.117*** | - | 0.0731 |
| | | (0.102) | (0.0102) | | (0.101) |
| **Colony**$_{ij}$ | - | 0.284*** | -0.137*** | - | 0.281*** |
| | | (0.106) | (0.0115) | | (0.106) |
| **Island**$_{i}$ | - | -0.570*** | -0.193*** | - | -0.582*** |
| | | (0.170) | (0.00348) | | (0.170) |
| **Landlocked**$_{i}$ | - | -2.071*** | -0.243*** | - | -2.092*** |
| | | (0.186) | (0.00326) | | (0.186) |
| **Volatility**$_{ijt}$ | -2.435*** | -2.416*** | -1.144*** | -2.927*** | -3.003*** |
| | (0.285) | (0.285) | (0.174) | (0.299) | (0.298) |
| **L1.Volatility**$_{ijt}$ | -2.560*** | -2.522*** | -0.868*** | -3.033*** | -3.090*** |
| | (0.339) | (0.339) | (0.171) | (0.351) | (0.350) |
| **L2.Volatility**$_{ijt}$ | -1.865*** | -1.833*** | -0.792*** | -2.334*** | -2.397*** |
| | (0.282) | (0.282) | (0.169) | (0.296) | (0.296) |
| **L3.Volatility**$_{ijt}$ | -0.617** | -0.594** | -2.426*** | -1.086*** | -1.153*** |
| | (0.298) | (0.298) | (0.170) | (0.312) | (0.312) |
| **ln ExRate**$_{ijt}$ | -0.0911** | -0.0904** | 0.0503** | -0.0911** | -0.0904** |
| | (0.0394) | (0.0394) | (0.0230) | (0.0394) | (0.0394) |
| **ln L1.ExRate**$_{ijt}$ | 0.0820** | 0.0820** | -0.0324 | 0.0824** | 0.0824** |
| | (0.0349) | (0.0349) | (0.0385) | (0.0348) | (0.0349) |
| **ln L2.ExRate**$_{ijt}$ | -0.0136 | -0.0145 | -0.0392 | -0.0134 | -0.0142 |
| | (0.0409) | (0.0409) | (0.0374) | (0.0409) | (0.0409) |
| **ln L3.ExRate**$_{ijt}$ | 0.0191 | 0.0195 | 0.00306 | 0.0186 | 0.0188 |
| | (0.0301) | (0.0301) | (0.0216) | (0.0301) | (0.0301) |
| **Corruption**$_{ijt}$ | 0.00117 | 0.00180 | -0.0020*** | - | - |
| | (0.00169) | (0.00168) | (0.000282) | | |
| **Zhat** | - | - | - | -0.0013*** | -0.0016*** |
| | | | | (0.000338) | (0.000329) |
| **IMR** | - | - | - | 2.545*** | 2.833*** |
| | | | | (0.182) | (0.178) |
| **Obs.** | 1,045,992 | 1,045,992 | 1,381,072 | 1,045,992 | 1,045,992 |
| **$R^2$** | 0.113 | 0.623 | - | 0.113 | 0.623 |
| **RMSE** | 1.243 | 1.244 | - | 1.243 | 1.244 |

Standard errors in parentheses; significance levels: * 10% ** 5% ***1%

Reported $R^2$ is within $R^2$ for FE estimations and overall $R^2$ for RE estimations.

**Table 7: Regression Results - Final Goods**

| | | | 1st Step | 2nd Step | 2nd Step |
|---|---|---|---|---|---|
| | **FE** | **RE** | **Probit** | **FE** | **RE** |
| **ln GDP**$_{ijt}$ | 0.416*** | 0.449*** | 0.451*** | 0.234*** | 0.450*** |
| | (0.0152) | (0.00907) | (0.00131) | (0.0227) | (0.00901) |
| **ln Distance**$_{ij}$ | - | -1.267*** | -0.734*** | - | -1.271*** |
| | | (0.0420) | (0.00381) | | (0.0417) |
| **EU**$_{ijt}$ | 0.202*** | 0.201*** | 0.439*** | 0.202*** | 0.200*** |
| | (0.00790) | (0.00789) | (0.00609) | (0.00787) | (0.00787) |
| **Euro**$_{ijt}$ | 0.0648*** | 0.0681*** | -0.241*** | 0.0741*** | 0.0718*** |
| | (0.00999) | (0.00993) | (0.00865) | (0.0104) | (0.0103) |
| **Border**$_{ij}$ | - | 0.857*** | 1.060*** | - | 0.865*** |
| | | (0.0760) | (0.0189) | | (0.0758) |
| **Language**$_{ij}$ | - | 0.144* | -0.0883*** | - | 0.157* |
| | | (0.0871) | (0.0135) | | (0.0866) |
| **Colony**$_{ij}$ | - | 0.338*** | -0.129*** | - | 0.349*** |
| | | (0.0922) | (0.0168) | | (0.0916) |
| **Island**$_{i}$ | - | -0.244* | -0.0110** | - | -0.252* |
| | | (0.147) | (0.00456) | | (0.146) |
| **Landlocked**$_{i}$ | - | -0.665*** | -0.233*** | - | -0.668*** |
| | | (0.161) | (0.00424) | | (0.160) |
| **Volatility**$_{ijt}$ | -2.426*** | -2.404*** | -0.987*** | -2.214*** | -2.365*** |
| | (0.234) | (0.234) | (0.200) | (0.248) | (0.247) |
| **L1.Volatility**$_{ijt}$ | -2.186*** | -2.167*** | -1.487*** | -1.932*** | -2.088*** |
| | (0.282) | (0.282) | (0.199) | (0.295) | (0.294) |
| **L2.Volatility**$_{ijt}$ | -1.438*** | -1.429*** | -0.510*** | -1.186*** | -1.347*** |
| | (0.235) | (0.235) | (0.197) | (0.250) | (0.249) |
| **L3.Volatility**$_{ijt}$ | -0.968*** | -0.957*** | -2.208*** | -0.724*** | -0.879*** |
| | (0.247) | (0.247) | (0.199) | (0.261) | (0.260) |
| **ln ExRate**$_{ijt}$ | -0.276*** | -0.276*** | -0.268*** | -0.274*** | -0.275*** |
| | (0.0347) | (0.0347) | (0.0297) | (0.0347) | (0.0347) |
| **ln L1.ExRate**$_{ijt}$ | -0.0592* | -0.0591* | -0.0931* | -0.0600* | -0.0599* |
| | (0.0311) | (0.0312) | (0.0499) | (0.0311) | (0.0312) |
| **ln L2.ExRate**$_{ijt}$ | 0.0667* | 0.0655* | -0.116** | 0.0659* | 0.0647* |
| | (0.0360) | (0.0360) | (0.0484) | (0.0360) | (0.0360) |
| **ln L3.ExRate**$_{ijt}$ | -0.0589** | -0.0589** | 0.410*** | -0.0602** | -0.0593** |
| | (0.0268) | (0.0268) | (0.0278) | (0.0268) | (0.0268) |
| **Corruption**$_{ijt}$ | 0.0003 | 0.0006 | 0.0106*** | - | - |
| | (0.00149) | (0.00148) | (0.000390) | | |
| **Zhat** | - | - | - | 0.0014*** | 0.00071** |
| | | | | (0.000362) | (0.000353) |
| **IMR** | - | - | - | 5.923*** | 6.156*** |
| | | | | (0.417) | (0.382) |
| **Obs.** | 879,509 | 879,509 | 1,035,804 | 879,509 | 879,509 |
| **$R^2$** | 0.167 | 0.683 | - | 0.167 | 0.683 |
| **RMSE** | 1.006 | 1.007 | - | 1.006 | 1.007 |

Standard errors in parentheses; significance levels: * 10% ** 5% ***1%

Reported $R^2$ is within $R^2$ for FE estimations and overall $R^2$ for RE estimations.

**Table 8: Fixed Effects Regressions - Capital Goods**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| **ln GDP**$_{ijt}$ | 0.426*** | 0.504*** | 0.632*** | 0.575*** | 0.446*** | 0.457*** |
| | (0.0300) | (0.0313) | (0.0291) | (0.0207) | (0.0382) | (0.0272) |
| **EU**$_{ijt}$ | 0.119*** | 0.119*** | 0.138*** | 0.143*** | 0.113*** | |
| | (0.0160) | (0.0160) | (0.0159) | (0.0159) | (0.0160) | |
| **Euro**$_{ijt}$ | -0.112*** | -0.112*** | -0.100*** | -0.0923*** | | -0.101*** |
| | (0.0207) | (0.0207) | (0.0206) | (0.0204) | | (0.0207) |
| **Volatility**$_{ijt}$ | -2.805*** | -2.923*** | | | -2.656*** | -3.091*** |
| | (0.514) | (0.513) | | | (0.513) | (0.512) |
| **L1.Volatility**$_{ijt}$ | -3.485*** | -3.520*** | | | -3.286*** | -3.879*** |
| | (0.612) | (0.612) | | | (0.611) | (0.610) |
| **L2.Volatility**$_{ijt}$ | -3.528*** | -3.459*** | | | -3.370*** | -3.965*** |
| | (0.509) | (0.508) | | | (0.508) | (0.505) |
| **L3.Volatility**$_{ijt}$ | -1.468*** | -1.455*** | | | -1.323** | -1.505*** |
| | (0.531) | (0.531) | | | (0.530) | (0.531) |
| **ln ExRate**$_{ijt}$ | -0.301*** | | -0.332*** | | -0.302*** | -0.300*** |
| | (0.0710) | | (0.0689) | | (0.0710) | (0.0710) |
| **ln L1.ExRate**$_{ijt}$ | 0.0499 | | 0.0849 | | 0.0499 | 0.0486 |
| | (0.0634) | | (0.0612) | | (0.0634) | (0.0634) |
| **ln L2.ExRate**$_{ijt}$ | 0.271*** | | 0.241*** | | 0.272*** | 0.274*** |
| | (0.0734) | | (0.0730) | | (0.0734) | (0.0734) |
| **ln L3.ExRate**$_{ijt}$ | 0.0825 | | 0.0933* | | 0.0823 | 0.0809 |
| | (0.0547) | | (0.0544) | | (0.0547) | (0.0547) |
| **Obs.** | 283,895 | 283,895 | 287,010 | 291,256 | 283,895 | 283,895 |
| **$R^2$** | 0.194 | 0.194 | 0.198 | 0.200 | 0.194 | 0.194 |

Standard errors in parentheses; significance levels: * 10% ** 5% ***1%

**Table 9: Fixed Effects Regressions - Intermediates**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| **ln GDP**$_{ijt}$ | 0.506*** | 0.560*** | 0.473*** | 0.606*** | 0.493*** | 0.631*** |
| | (0.0325) | (0.0131) | (0.0159) | (0.0104) | (0.0199) | (0.0174) |
| **EU**$_{ijt}$ | 0.0891*** | 0.0890*** | 0.101*** | 0.103*** | 0.0936*** | |
| | (0.00898) | (0.00898) | (0.00888) | (0.00887) | (0.00897) | |
| **Euro**$_{ijt}$ | 0.0939*** | 0.0939*** | 0.104*** | 0.100*** | | 0.101*** |
| | (0.0116) | (0.0116) | (0.0115) | (0.0115) | | (0.0116) |
| **Volatility**$_{ijt}$ | -2.435*** | -2.450*** | | | -2.559*** | -2.659*** |
| | (0.285) | (0.284) | | | (0.284) | (0.284) |
| **L1.Volatility**$_{ijt}$ | -2.560*** | -2.534*** | | | -2.722*** | -2.866*** |
| | (0.339) | (0.338) | | | (0.338) | (0.337) |
| **L2.Volatility**$_{ijt}$ | -1.865*** | -1.875*** | | | -1.993*** | -2.203*** |
| | (0.282) | (0.282) | | | (0.282) | (0.280) |
| **L3.Volatility**$_{ijt}$ | -0.615** | -0.613** | | | -0.738** | -0.648** |
| | (0.298) | (0.298) | | | (0.297) | (0.298) |
| **ln ExRate**$_{ijt}$ | -0.0911** | | -0.115*** | | -0.0910** | -0.0904** |
| | (0.0394) | | (0.0383) | | (0.0394) | (0.0394) |
| **ln L1.ExRate**$_{ijt}$ | 0.0820** | | 0.0892*** | | 0.0820** | 0.0809** |
| | (0.0349) | | (0.0337) | | (0.0349) | (0.0349) |
| **ln L2.ExRate**$_{ijt}$ | -0.0136 | | -0.0217 | | -0.0139 | -0.0122 |
| | (0.0409) | | (0.0407) | | (0.0409) | (0.0409) |
| **ln L3.ExRate**$_{ijt}$ | 0.0191 | | 0.0192 | | 0.0195 | 0.0185 |
| | (0.0301) | | (0.0299) | | (0.0301) | (0.0301) |
| **Obs.** | 1,045,992 | 1,045,992 | 1,057,399 | 1,073,052 | 1,045,992 | 1,045,992 |
| **$R^2$** | 0.113 | 0.113 | 0.116 | 0.119 | 0.113 | 0.113 |

Standard errors in parentheses; significance levels: * 10% ** 5% ***1%

**Table 10: Fixed Effects Regressions - Final Goods**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| **ln GDP**$_{ijt}$ | 0.417*** | 0.352*** | 0.639*** | 0.538*** | 0.439*** | 0.456*** |
| | (0.0127) | (0.0140) | (0.0134) | (0.0132) | (0.0109) | (0.0128) |
| **EU**$_{ijt}$ | 0.202*** | 0.202*** | 0.209*** | 0.209*** | 0.205*** | |
| | (0.00787) | (0.00787) | (0.00778) | (0.00780) | (0.00785) | |
| **Euro**$_{ijt}$ | 0.0648*** | 0.0647*** | 0.0705*** | 0.0722*** | | 0.0813*** |
| | (0.00999) | (0.00999) | (0.00996) | (0.00992) | | (0.00997) |
| **Volatility**$_{ijt}$ | -2.426*** | -2.492*** | | | -2.502*** | -2.896*** |
| | (0.234) | (0.234) | | | (0.234) | (0.233) |
| **L1.Volatility**$_{ijt}$ | -2.186*** | -2.193*** | | | -2.288*** | -2.846*** |
| | (0.282) | (0.282) | | | (0.282) | (0.281) |
| **L2.Volatility**$_{ijt}$ | -1.438*** | -1.420*** | | | -1.518*** | -2.189*** |
| | (0.235) | (0.235) | | | (0.235) | (0.233) |
| **L3.Volatility**$_{ijt}$ | -0.967*** | -0.979*** | | | -1.045*** | -1.001*** |
| | (0.247) | (0.247) | | | (0.247) | (0.247) |
| **ln ExRate**$_{ijt}$ | -0.276*** | | -0.291*** | | -0.276*** | -0.275*** |
| | (0.0347) | | (0.0338) | | (0.0347) | (0.0347) |
| **ln L1.ExRate**$_{ijt}$ | -0.0592* | | -0.0582* | | -0.0591* | -0.0615** |
| | (0.0311) | | (0.0301) | | (0.0311) | (0.0311) |
| **ln L2.ExRate**$_{ijt}$ | 0.0667* | | 0.0654* | | 0.0665* | 0.0713** |
| | (0.0360) | | (0.0359) | | (0.0360) | (0.0360) |
| **ln L3.ExRate**$_{ijt}$ | -0.0589** | | -0.0447* | | -0.0587** | -0.0614** |
| | (0.0268) | | (0.0267) | | (0.0268) | (0.0268) |
| **Obs.** | 879,509 | 879,509 | 889,410 | 902,978 | 879,509 | 879,509 |
| $\mathbf{R^2}$ | 0.167 | 0.166 | 0.170 | 0.171 | 0.167 | 0.166 |

Standard errors in parentheses; significance levels: * 10% ** 5% ***1%

**Table 11: Beta Coefficients**

| | Capital Goods | | | | Intermediates | | | | Final Goods | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2nd Step | 2nd Step | | | 2nd Step | 2nd Step | | | 2nd Step | 2nd Step |
| | **FE** | **RE** | **FE** | **RE** | **FE** | **RE** | **FE** | **RE** | **FE** | **RE** | **FE** | **RE** |
| **ln GDP$_{ijt}$** | 0.364 | 0.385 | 0.198 | 0.380 | 0.492 | 0.368 | 0.476 | 0.372 | 0.346 | 0.374 | 0.195 | 0.374 |
| **ln Distance$_{ij}$** | | -0.374 | | -0.374 | | -0.429 | | -0.434 | | -0.401 | | -0.403 |
| **EU$_{ijt}$** | 0.019 | 0.019 | 0.020 | 0.020 | 0.013 | 0.013 | 0.013 | 0.013 | 0.034 | 0.034 | 0.034 | 0.034 |
| **Euro$_{ijt}$** | -0.013 | -0.012 | -0.008 | -0.009 | 0.010 | 0.009 | 0.008 | 0.007 | 0.008 | 0.008 | 0.009 | 0.008 |
| **Border$_{ij}$** | | 0.062 | | 0.067 | | 0.106 | | 0.103 | | 0.088 | | 0.088 |
| **Language$_{ij}$** | | 0.015 | | 0.016 | | 0.006 | | 0.005 | | 0.011 | | 0.012 |
| **Colony$_{ij}$** | | 0.037 | | 0.040 | | 0.018 | | 0.017 | | 0.024 | | 0.024 |
| **Island$_{i}$** | | -0.107 | | -0.111 | | -0.078 | | -0.079 | | -0.039 | | -0.040 |
| **Landlocked$_{i}$** | | -0.352 | | -0.355 | | -0.322 | | -0.326 | | -0.119 | | -0.119 |
| **Volatility$_{ijt}$** | -0.007 | -0.006 | -0.004 | -0.005 | -0.005 | -0.005 | -0.006 | -0.006 | -0.006 | -0.006 | -0.006 | -0.006 |
| **L1.Volatility$_{ijt}$** | -0.008 | -0.008 | -0.005 | -0.007 | -0.005 | -0.005 | -0.006 | -0.007 | -0.006 | -0.006 | -0.005 | -0.005 |
| **L2.Volatility$_{ijt}$** | -0.009 | -0.008 | -0.005 | -0.007 | -0.004 | -0.004 | -0.005 | -0.005 | -0.004 | -0.004 | -0.003 | -0.004 |
| **L3.Volatility$_{ijt}$** | -0.004 | -0.003 | 0.000 | -0.002 | -0.001 | -0.001 | -0.002 | -0.003 | -0.003 | -0.003 | -0.002 | -0.002 |
| **ln ExRate$_{ijt}$** | -0.306 | -0.301 | -0.304 | -0.300 | -0.083 | -0.082 | -0.082 | -0.082 | -0.289 | -0.289 | -0.287 | -0.287 |
| **ln L1.ExRate$_{ijt}$** | 0.051 | 0.059 | 0.051 | 0.058 | 0.074 | 0.074 | 0.075 | 0.075 | -0.062 | -0.062 | -0.063 | -0.063 |
| **ln L2.ExRate$_{ijt}$** | 0.277 | 0.245 | 0.277 | 0.246 | -0.012 | -0.013 | -0.012 | -0.013 | 0.070 | 0.069 | 0.069 | 0.068 |
| **ln L3.ExRate$_{ijt}$** | 0.085 | 0.077 | 0.082 | 0.075 | 0.017 | 0.018 | 0.017 | 0.017 | -0.062 | -0.062 | -0.064 | -0.063 |
| **Corruption$_{ijt}$** | -0.021 | -0.020 | | | | | | | 0.001 | 0.002 | | |
| **Zhat** | | | 0.028 | 0.015 | | | -0.007 | -0.009 | | | 0.007 | 0.004 |
| **IMR** | | | 0.005 | 0.014 | | | 0.012 | 0.014 | | | 0.009 | 0.009 |
| **Obs.** | 283,895 | 283,895 | 283,895 | 283,895 | 1,045,992 | 1,045,992 | 1,045,992 | 1,045,992 | 879,509 | 879,509 | 879,509 | 879,509 |

**Table 12: Robustness Checks (RE Regressions as in Column (2) in Tables 5, 6 and 7)**

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
|---|---|---|---|---|---|---|---|---|---|---|
| | Sample 1999-2010 | | | Without Big Four | | | Adding Countries to Sample (Capital Goods) | | | |
| Sectors | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 1 | 1 | 1 |
| **ln GDP$_{ijt}$** | 0.474*** | 0.529*** | 0.477*** | 0.448*** | 0.489*** | 0.390*** | 0.477*** | 0.461*** | 0.460*** | 0.459*** |
| | (0.0134) | (0.0109) | (0.00954) | (0.0112) | (0.00964) | (0.00840) | (0.0121) | (0.0119) | (0.0119) | (0.0129) |
| **ln Distance$_{ij}$** | -1.201*** | -1.549*** | -1.265*** | -1.266*** | -1.575*** | -1.315*** | -1.246*** | -1.222*** | -1.217*** | -1.297*** |
| | (0.0554) | (0.0499) | (0.0437) | (0.0482) | (0.0473) | (0.0415) | (0.0488) | (0.0498) | (0.0502) | (0.0524) |
| **EU$_{ijt}$** | 0.130*** | 0.0958*** | 0.204*** | 0.0564*** | 0.0775*** | 0.136*** | 0.0893*** | 0.119*** | 0.127*** | 0.129*** |
| | (0.0162) | (0.00902) | (0.00797) | (0.0165) | (0.00980) | (0.00846) | (0.0165) | (0.0163) | (0.0161) | (0.0163) |
| **Euro$_{ijt}$** | -0.0761*** | 0.134*** | 0.107*** | -0.103*** | 0.116*** | 0.0680*** | -0.104*** | -0.103*** | -0.105*** | -0.0841*** |
| | (0.0244) | (0.0140) | (0.0120) | (0.0211) | (0.0127) | (0.0108) | (0.0211) | (0.0209) | (0.0206) | (0.0208) |
| **Border$_{ij}$** | 0.601*** | 1.153*** | 0.860*** | 0.539*** | 1.255*** | 0.816*** | 0.501*** | 0.581*** | 0.603*** | 0.492*** |
| | (0.0998) | (0.0897) | (0.0790) | (0.0885) | (0.0869) | (0.0766) | (0.0896) | (0.0888) | (0.0900) | (0.0946) |
| **Language$_{ij}$** | 0.193* | 0.103 | 0.152* | 0.304*** | 0.00207 | 0.179** | 0.298*** | 0.249** | 0.213** | 0.322*** |
| | (0.115) | (0.104) | (0.0906) | (0.105) | (0.104) | (0.0908) | (0.101) | (0.102) | (0.104) | (0.108) |
| **Colony$_{ij}$** | 0.548*** | 0.290*** | 0.338*** | 0.172 | 0.247** | 0.143 | 0.363*** | 0.543*** | 0.533*** | 0.819*** |
| | (0.121) | (0.109) | (0.0959) | (0.122) | (0.120) | (0.106) | (0.113) | (0.108) | (0.109) | (0.117) |
| **Island$_{i}$** | -0.815*** | -0.578*** | -0.156 | 0.149 | 0.104 | 1.210*** | -0.912*** | -1.034*** | -1.027*** | -1.293*** |
| | (0.199) | (0.172) | (0.152) | (0.186) | (0.167) | (0.147) | (0.184) | (0.185) | (0.186) | (0.193) |
| **Landlocked$_{i}$** | -1.510*** | -2.275*** | -1.116*** | -1.247*** | -1.575*** | 0.872*** | -2.123*** | -1.721*** | -1.655*** | -1.358*** |
| | (0.264) | (0.193) | (0.169) | (0.247) | (0.191) | (0.166) | (0.248) | (0.237) | (0.235) | (0.263) |
| **Volatility$_{ijt}$** | -0.0637 | -1.349*** | -1.162*** | -0.236 | -1.024** | -0.968*** | -0.250 | -0.452 | -0.329 | -0.154 |
| | (0.764) | (0.424) | (0.341) | (0.769) | (0.455) | (0.355) | (0.776) | (0.738) | (0.731) | (0.748) |
| **L1.Volatility$_{ijt}$** | -0.699 | 1.202** | -0.00509 | -0.510 | 1.176** | -0.277 | -0.561 | -1.590 | -1.709* | -1.744* |
| | (0.985) | (0.550) | (0.443) | (0.999) | (0.596) | (0.465) | (1.008) | (0.970) | (0.959) | (0.987) |
| **L2.Volatility$_{ijt}$** | 2.008** | 0.0105 | 1.635*** | 1.626 | -0.682 | 1.761*** | 1.814* | 1.427 | 1.373 | 1.564 |
| | (1.007) | (0.560) | (0.454) | (1.040) | (0.616) | (0.482) | (1.049) | (0.996) | (0.983) | (1.016) |
| **L3.Volatility$_{ijt}$** | -0.547 | 0.153 | -0.225 | -0.480 | 0.970** | 0.436 | -0.518 | -0.807 | -0.550 | -0.555 |
| | (0.753) | (0.415) | (0.339) | (0.795) | (0.464) | (0.365) | (0.801) | (0.746) | (0.737) | (0.760) |
| **ln ExRate$_{ijt}$** | 0.878 | -0.408 | -0.195 | 0.363 | -0.524 | -0.0683 | 0.930 | 0.279 | 0.155 | -0.0256 |
| | (0.582) | (0.323) | (0.286) | (0.655) | (0.386) | (0.336) | (0.633) | (0.490) | (0.471) | (0.508) |
| **ln L1.ExRate$_{ijt}$** | -3.464*** | 0.645 | -0.183 | -2.301 | 0.699 | -0.325 | -2.837** | -1.863* | -1.632 | -1.437 |
| | (1.255) | (0.694) | (0.616) | (1.445) | (0.851) | (0.739) | (1.399) | (1.080) | (1.041) | (1.116) |
| **ln L2.ExRate$_{ijt}$** | 3.299*** | 0.00908 | 0.838 | 1.647 | -0.133 | 0.535 | 1.439 | 1.226 | 1.300 | 1.531 |
| | (1.179) | (0.650) | (0.579) | (1.434) | (0.846) | (0.735) | (1.392) | (1.058) | (1.022) | (1.096) |
| **ln L3.ExRate$_{ijt}$** | -0.831* | -0.256 | -0.802*** | 0.376 | 0.0121 | -0.448 | 0.549 | 0.249 | 0.0475 | -0.386 |
| | (0.499) | (0.274) | (0.245) | (0.640) | (0.378) | (0.329) | (0.621) | (0.466) | (0.450) | (0.485) |
| **Corruption$_{ijt}$** | -0.00826** | 0.00143 | 0.00143 | 0.00280 | 0.00737*** | 0.0115*** | 0.00230 | -0.00394 | -0.00577* | -0.0112*** |
| | (0.00332) | (0.00184) | (0.00164) | (0.00345) | (0.00202) | (0.00176) | (0.00349) | (0.00325) | (0.00316) | (0.00311) |
| **Year > 1998** | yes | yes | yes | - | - | - | - | - | - | - |
| **USA** | yes | yes | yes | - | - | - | yes | yes | yes | yes |
| **Russia** | yes | yes | yes | - | - | - | - | yes | yes | yes |
| **Japan** | yes | yes | yes | - | - | - | - | - | yes | yes |
| **China** | yes | yes | yes | - | - | - | - | - | - | yes |
| **Turkey** | yes | yes | yes | yes | yes | yes | yes | yes | yes | - |
| **Obs.** | 258,383 | 950,750 | 800,811 | 226,992 | 837,354 | 702,413 | 242,764 | 256,432 | 270,343 | 270,092 |
| **$R^2$** | 0.694 | 0.619 | 0.680 | 0.719 | 0.649 | 0.704 | 0.715 | 0.709 | 0.705 | 0.708 |
| **RMSE** | 1.186 | 1.254 | 1.026 | 1.112 | 1.249 | 0.999 | 1.148 | 1.162 | 1.166 | 1.183 |

Standard errors in parentheses; significance levels: * 10% ** 5% ***1%

Sector 1, 2 and 3 denote capital, intermediate and final goods, respectively.