Financial development and trade: evidence from the world's three largest economies.

Resiandini, Pramesti

Auburn University

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Evidence from the World's Three Largest Economies

Pramesti Resiandini*

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Abstract

This paper examines the relationship between financial development and trade based on panel data of bilateral trade between the world's three largest economies (United States, Japan, and Germany) and 47 partner countries over the period 2003 to 2007. Access to loans for businesses has a strong positive relationship with bilateral trade. Access to the local equity market raises trade with less developed countries, but lowers trade with developed countries. The study also finds that international financial indicators are significant determinants of trade.

Keywords: Financial development; International trade flows; Gravity model

JEL Classifications: G1; F14; F15

*Department of Agricultural Economics and Rural Sociology, Auburn University, Auburn, AL 36849, USA. Tel: 1-334-844-5628. Fax: 1-334-844-5639. Email: pzr0002@auburn.edu.

1 Introduction

Numerous studies examine the relationship between international trade and economic growth, as well as between financial development and economic growth.[1] The importance of trade and financial development in the growth literature provides motivation to study the relationship between the two. Most of the existing studies on this issue examine individually specific measures of financial development, e.g., private credit and foreign investment.[2] The present study aims to contribute to the literature by investigating several measures of financial development using a gravity model of bilateral trade between the world's three largest economies (United States, Japan, and Germany) and their 47 major trading partners over the period 2003 to 2007.

This paper examines access to external funds and international financial indicators as the measures of financial development. The main hypothesis tested is that financial development in a country relates to the degree of bilateral trade with its trading partners. A gravity model is constructed and estimated with a fixed effects method. The model includes three variables commonly used in a gravity equation: distance between pair countries, land common border, and stage of development. Ease of access to loans and ease of access to the local equity market are variables that represent access to external funds for businesses. Three international financial indicators are included: country credit ratings, international capital market controls, and real

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[1] Frankel and Romer (1999), among others, find a positive relationship between international trade and economic growth. Several studies suggesting the importance of financial development for economic growth are Levine and Zervos (1998), Levine, Loayza and Beck (2000), and Demirgüç-Kunt and Levine (2001).

[2] The World Economic Forum (2009, p. 3) defines financial development as "the factors, policies, and institutions that lead to effective financial intermediation and markets, as well as deep and broad access to capital and financial services."

exchange rates. A country's credit rating and capital controls capture its access to foreign capital, whereas the real exchange rate plays a role in determining profitability of tradables.

Throughout this paper, the term 'main countries' will refer to the three largest economies, and 'partner countries' will refer to the 47 trading partners. The study finds differences when grouping partner countries into developed and less developed countries affecting the degree of bilateral trade with the main countries. Access to loans for businesses shows a strong positive relationship with bilateral trade. Access to the local equity market is negatively related to trade with developed countries, but it is positively related to trade with less developed countries. The study also finds that country credit ratings, international capital market controls, and real exchange rates are significant determinants of trade. Further, the study suggests the role policy can play in promoting both trade and development.

The remainder of the paper proceeds as follows. Section 2 explains data. Section 3 provides literature review on financial development and trade. Section 4 and Section 5 discuss the empirical methods and results. Section 6 concludes the paper with a summary of findings.

2 Data

The data set is a balanced panel of bilateral trade between the three main countries (United States, Japan, and Germany) and 47 partner countries over the period 2003 to 2007. The entire data set comprises 690 observations. Sample selection is based on the average levels of GDP of IMF reporting countries over the five year period and availability of other data. The top three countries based on the average GDP are selected as the main countries and the rest as partner countries, as shown in Table 1. The total trade between the main countries and partner

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countries during the period represents about 70% of the total world trade of the three main countries.

[Table 1 here]

A major data source used in this study is the International Monetary Fund (IMF) databases. The bilateral trade data are obtained from the IMF's Direction of Trade (DOT) database, the GDP data are from the IMF's World Economic Outlook (WEO) database, and the real effective exchange rate data are from the IMF's International Financial Statistics (IFS) database. The IMF trade data follows United Nation's guidelines, which sufficiently covers all merchandise entering or leaving a country, except goods in transit. The IMF's IFS database provides an indicator of real effective exchange rates based on relative consumer prices, allowing for comparison with a broad range of partner countries. The weighting method is based on disaggregated trade flows for manufactured goods and primary products over the period 1999 to 2001 (IMF, 2009).

Another data source is the World Economic Forum's (WEF) Global Competitiveness Reports (2003-2007). The WEF reports the indices of access to loans (Ease of Access to Loan) and access to the local equity markets (Ease of Access to Equity). These indices are scaled 1 to 7 with higher scale indicating easier access to obtain loans or to raise capital through the local equity market. They are based on surveys on the perceptions of business executives worldwide conducted by the WEF. The same report contains the Stages of Development index, dividing countries into different stages of development (Stage 1 to Stage 3) based on the real GDP per capita. The last index is used in this study as a basis for grouping countries into developed countries (Stage 3; GDP per capita > USD 17,000) and less developed countries (Stage 1 and Stage 2; GDP per capita ≤ USD 17,000).

The Economic Freedom Network's Economic Freedom of the World Report (Gwartney and Lawson, 2009) provides data on international capital market controls. The related index is scaled 1 to 10 with higher scale indicating more controls that encourage capital flows. It is constructed based on two sub indices: (1) foreign ownership/investment restrictions, and (2) capital controls. The sources of the two sub indices are the WEF's Global Competitiveness Report and the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions. The data on country credit ratings are from various editions of the Institutional Investor (2003-2007). The creditworthiness of each country is evaluated on a scale of 1 to 100 with higher scale indicating higher rating. The rating is constructed based on a compilation of economic, financial, and political indicators assessed by senior economists and risk analysts worldwide.

The data on distances are from Centre d'Etudes Prospectives et d'Informations Internationales (CEPII) Geodesic distances database (2010). CEPII calculates geodesic distances following the great circle formula, using latitudes and longitudes of the most important cities/agglomerations in terms of population.

3 Finance and trade literature

The literature indicates that there is a significant relationship between financial development and trade. Beck (2002) provides a theoretical model examining the relationship between financial development and trade, focusing on the role played by financial intermediaries in facilitating high-return manufacturing projects. Using panel data on private credit for 65 countries over a 30-year period, the study finds that financial development strongly affects export volume and trade balance of manufacturing industries (2002, p. 107). In a subsequent paper, Beck (2003) finds that countries in which financial systems are relatively highly

developed tend to have higher export shares and trade balances when industries rely more on external finance.

A broad range of literature link international capital flows to trade. Some of the studies use macroeconomic models, usually based on the adjustments to changes in trade regulations or capital market controls. McKinnon (1993) suggests the importance of capital market controls in determining trade flows. Mundell (1957), on the other hand, examines the effect of trade openness on capital flows. Based on a 2x2 Heckscher-Ohlin factor endowment model, Mundell suggests that barriers to trade encourage international capital flows that if unhindered increase the output of the host country's import-competing sector. Several recent papers on this issue relate trade openness to the stability of capital flows. Cavallo and Frankel (2008) provide empirical evidence that trade openness makes countries less susceptible to sudden stops in capital inflows and thus less susceptible to crises.

Other studies on trade and capital flows utilize microeconomic models, focusing on firm-level problems such as costs and sales. These studies examine specifically the relationship between trade and foreign direct investment (FDI). A model of trade-FDI relationship is known as the "Proximity-Concentration Tradeoff." This model suggests that multinational companies choose exporting over FDI when they face higher fixed costs in the host countries than trade costs, and they choose FDI over exporting when the trade costs are higher than fixed costs (Smith, 1987; Neary, 2002). The model assumes that trade and FDI are substitutes. Neary (2009) argues, however, that the proximity-concentration tradeoff applies to horizontal FDI only.

A vertical FDI model suggests that trade and FDI can be complements if countries differ either in technology or endowments of specific factors (Markunsen, 1983; Neary, 1995). Trade liberalization can encourage FDI if the induced capital flows lead to an increase in production of

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the host country's exporting sector. Using a Heckscher-Ohlin model, Helpman (1984) finds that when stages of production vary in factor intensities, differences in factor endowments between countries may encourage vertical disintegration by firms.

Based on data of U.S. capital outflows, Ruffin and Rassekh (1986) argue that foreign direct investment and portfolio investment are perfect substitutes. They note that the way multinational corporations finance their operations may be unrelated to the net flow of capital between countries (p. 1126). A recent article on foreign direct investment and portfolio investment is Goldstein and Razin (2005). Using a model of information-based tradeoffs between direct investment and portfolio investment, they compare the expected yields on the two types of foreign investment. Goldstein and Razin find that developed countries attract more portfolio investment relative to direct investment than less developed countries due to the higher fixed costs associated with direct investment in developed countries. They also note that the high levels of transparency make portfolio investment in developed countries more efficient.

Real exchange rate and its role in determining the profitability of tradables have been attracting more attention in the recent economic growth literature. Freund and Pierola (2008) find that a large real depreciation that leads to undervaluation of the currency and a reduction in exchange rate volatility generates export growth in developing countries. It is often suggested that exchange rate volatility reduces trade; however, the empirical evidence is not robust to some specifications (Clark, Tamirisa, and Wei, 2004; Baxter and Kouparitsas, 2006). Furthermore, Gala (2008) notes that "currency misalignment measures are far from consensual" (p. 279) and contributes to the literature by theoretically and empirically connecting real exchange rate levels and economic development. This author finds that real exchange rate levels could affect economic growth through capital accumulation and technological development.

4 Gravity model

Gravity models have been widely used in examining international trade flows. Proposed by Tinbergen (1962), the gravity equation is later developed by several authors who provide the microfoundation. The gravity model predicts that trade flows between two countries are inversely related to the physical distance between them and directly related to the multiplicative interaction of each country's size, which is measured by GDP. [3]

The gravity equation for bilateral trade T_{ij} is specified as follows.

$$(1) \qquad T_{ij} = \beta_o \, Y_i^{\beta_1} \, Y_j^{\beta_2} \, D_{ij}^{\beta_3} \, \varepsilon_{ij}$$

where $Y_{i(j)}$ denotes GDP of country i(j) and D_{ij} denotes the distance between country i and j; β_o, $\beta_1, \beta_2,$ and β_3 are unknown parameters and ε_{ij} is a stochastic error term.

Taking natural logarithms of both sides, the gravity equation can be estimated.

$$(2) \qquad \ln T_{ij} = \beta_o + \beta_1 \ln Y_i + \beta_2 \ln Y_j + \beta_3 \ln D_{ij} + \varepsilon_{ij}$$

Adding Z_{ij} and W_{ij} as continuous variables and dummy variables of interest in the study, the gravity equation is rewritten as follows.

$$(3) \qquad \ln T_{ij} = \beta_o + \beta_1 \ln Y_i + \beta_2 \ln Y_j + \beta_3 \ln D_{ij} + \gamma \ln Z_{ij} + \delta \, W_{ij} + \varepsilon_{ij}$$

Following Anderson and van Wincoop (2003), a framework that accounts for multilateral (price) resistance terms is built by including $P_i^{1-\sigma}$ and $P_j^{1-\sigma}$, exporter and importer price indices. The model proposes that the degree of trade is determined not only by the national borders between country i and country j but also by the multilateral resistance from their trading partners

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[3] Anderson (1979) develops a microfoundation for the gravity model using constant elasticity of substitution (CES) expenditure system. It proves algebraically that level of trade is related to the size (income) of countries as well as trade costs. Trade costs include: (1) transport costs as an increasing function of distance, and (2) tariffs.

in the rest of the world.[4]   It also moves the GDP terms from the right to the left side of the

gravity equation.

(4) $\ln [T_{ij}/(Y_i Y_j)] = \beta_o + \beta_3 \ln D_{ij} + \gamma \ln Z_{ij} + \delta\ W_{ij} - \ln P_i{}^{1\text{-}\sigma} - \ln P_j{}^{1\text{-}\sigma} + \varepsilon_{ij}$

where,

(5) $P_i{}^{1\text{-}\sigma} = \sum_{i=1}^{N} P_i^{\sigma-1} \left(\frac{Y_i}{Y_w}\right)\ e^{\beta 3\ \ln Dij\ +\ \gamma \ln\ Zij\ +\ \delta\ Wij}$

with $i = 1... N$ equilibrium conditions; Y_w denotes world GDP (constant across countries); and σ

is the elasticity of substitution between countries.

Anderson and van Wincoop (2003) utilize a nonlinear least squares program to estimate

the multilateral resistance terms. As an alternative method, Feenstra (2004) suggests using

country-specific fixed effects to count for the multilateral resistance terms. Baier and Bergstrand

(2007) include country-pair fixed effects, in addition to country-specific fixed effects, to capture

the effects of free trade agreements (FTA).

This paper follows the measure of bilateral trade by Helpman (1987), developed by

Feenstra (2004). In a panel setting, they define bilateral trade between country i and country j in

period t, T_{ijt}, as: $T_{ijt} = \ln(X_{ijt} + X_{jit})$, where X_{ijt} denotes exports from country i to country j in

period t and X_{jit} denotes the reverse. The conceptual model is as follows.

(6)   *Trade* = f(*Gravity*, *External Funds*, *International Finance*, *Other*)

where,

Trade is the level of trade between pair countries relative their level of GDP.

Gravity is a group of variables commonly used in gravity equations.

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[4] McCallum (1995) provides empirical evidence that national borders matter for trade flows.

External Funds is a group of variables indicating access to external funds.

International Finance is a group of international financial indicators.

Other is a group of other variables controlling for fixed effects.

[Figure 1 here]

The variables of interests in this study, Z_{ij}, are the financial development variables. The External Funds variables are access to loans and access to the local equity market. The International Finance variables are country credit ratings, international capital market controls, and real exchange rates. W_{ij} represents dummy variables commonly used in gravity equations (i.e., land common border and stage of development).

The present study uses a fixed effects method based on Anderson and van Wincoop (2003) and Baier and Bergstrand (2007) to estimate the gravity equation, controlling for country-specific by time fixed effects and country-pair effects. Taking into account the effects of FTAs in addition to the multilateral resistance terms is important because at least two major FTAs (EU and NAFTA) affect trade between a number of countries in the data set.

The gravity equation is specified as follows.

(7) $\quad TRA_{ijt} = \beta_o + \beta_1\, DIS_{ij} + \beta_2\, LCB_{ij} + \beta_3\, DEV_{ijt} + \beta_4\, LNA_{ijt} + \beta_5\, EQA_{ijt} + \beta_6\, CCR_{ijt}$

$\quad\quad\quad + \beta_7\, CAP_{ijt} + \beta_8\, RER_{ijt} + \gamma_{it} + \delta_{jt} + \alpha_{ij} + \varepsilon_{ijt}$

where i denotes main countries, j denotes partner countries, t denotes time; and the variables are:

TRA_{ijt} = log of total bilateral trade volume between i and j relative to their levels of GDP.

DIS_{ij} = log of the distance between i and j.

LCB_{ij} = a dummy variable which is unity if i and j share a common land border.

DEV_{ijt} = a dummy variable which is unity if i and j are in the same stage of development.

LNA_{ijt} = log of the product of the scores of access to loans in i and j.

EQA_{ijt} = log of the product of the scores of access to local equity market in i and j.

CCR_{ijt} = the difference between the log of the maximum of the country credit ratings of i

and j and the log of the minimum of the country credit ratings of i and j.

CAP_{ijt} = log of the product of the scores of capital controls in i and j.

RER_{ijt} = the difference between the log of the maximum of the real effective exchange

rates of i and j and the log of the minimum of the real effective exchange rates of i

and j.[5]

γ_{it} = interactions between country i and year dummies

δ_{jt} = interactions between country j and year dummies

α_{ij} = interactions between country i and country j dummies

ε_{ijt} = other influences on bilateral trade

The financial development variables are measured with interaction forms similar to those

of the common gravity variables. Two forms of bilateral interaction are constructed for the

financial development variables, following the methods used by Baxter and Kouparitsas (2006)

in measuring factor intensity.

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[5] Real exchange rate is defined as: $RER = e \times P_{FC}/P_{DC}$, where e is nominal exchange rate (DC/FC) and P_{FC}/P_{DC} is the ratio of price levels in the two countries. DC denotes domestic currency and FC denotes foreign currency. However, the data used are real effective exchange rates, the averages of bilateral real exchange rates between the country and each of its trading partners, weighted by the respective trade shares of each partner. The IMF's real effective exchange rates index (based on relative consumer prices) is used to allow for comparison with a broad range of partner countries.

The first measure is the log of the product of the levels of 'factor' in the two countries,

(8)   Interaction term 1: $\ln(F_{it} * F_{jt})$

where $F_{it(jt)}$ stands for the factor in country i(j) in period t. This measure of 'scale' can be interpreted as: "the higher the measure, the higher the levels of factor in the two countries or in either of the two countries." It also suggests that "the higher the measure, the more equal the levels of factor in the two countries." This interaction form is applied to the measures of access to loans (LNA), access to equity market (EQA), and international capital market controls (CAP).

The second measure is the difference between the log of the maximum and the log of the minimum levels of factor in the two countries, or

(9)   Interaction term 2: $\ln[\max(F_{it}, F_{jt})/\min(F_{it}, F_{jt})]$

This measure can be interpreted as follows: "the larger the measure, the larger the difference in the levels of factors in the two countries." This interaction form is applied to the measures of country credit ratings (CCR) and real exchange rates (RER).

Equation (8) is based on a similar method of measuring the scale of GDP for pair countries, whereas equation (9) is often used in gravity literature to measure the differences in GDP per capita between pair countries. Baxter and Kouparitsas (2006) also use both equations as the measures of human capital.

[Table 2 here]

5 Empirical results

[Table 3 here]

The estimations of the gravity model are presented in Table 3. The adjusted R-squared of the regression using all 690 observations indicates that 93.7% of the variation in bilateral trade is explained by the model. Dataset 1 shows that stage of development variable has a significant negative relationship with bilateral trade at 1% level. This result justifies the separation of data based on partner country's stage of development (developed and less developed countries).

(a) *Developed (partner) countries*

A developed (partner) country is a trading partner that shares the same stage of development as the three main countries, represented by a dummy variable that is in unity. Panel data of developed countries, named Dataset 2, comprise 318 observations. The adjusted R-squared shows 95.8% of the variation in bilateral trade is explained by the model. As expected, distance between pair countries has a negative relationship with bilateral trade at 1% level of significance. Main countries trade more with developed countries located closer to them. Land common border indicates a strong positive relationship with trade between developed countries, also significant at 1% level.

Access to loans has a positive relationship with bilateral trade at 5% level of significance, suggesting that trade between countries increases when it is easier for businesses to obtain loans. Access to equity shows a negative relationship with bilateral trade at 1% level of significance, indicating that trade between countries decreases when it is easier for businesses to raise capital through the local equity markets. Since the pair countries in this data set are both developed countries, this result seems to be intuitively correct. The rationale for this result may relate to the

degree of efficiency of the equity markets. In developed countries, the equity markets have high levels of transparency and thus more efficient than those in less developed countries (Goldstein and Razin, 2005). Easy access to highly efficient equity markets may encourage multinational companies to substitute trade with investment in local suppliers. Thus, easier access to equity market lowers trade.

The country credit ratings variable indicates a strong negative relationship with bilateral trade at 1% level of significance. The larger the difference in credit ratings of the two countries, the less trade occurs between them. The capital controls variable also shows a strong negative relationship with bilateral trade at 1% level of significance. It suggests that trade between two countries decreases when the countries relax their international capital market controls. This result indicates a substitution relationship between international trade and foreign investment in local companies, consistent with the trade-horizontal FDI model proposed by Smith (1987) and Neary (2002). The real exchange rate variable is positively related to bilateral trade at 1% level of significance, indicating the larger the difference in real exchange rates of pair countries, the more trade occurs between them.

(b) *Less developed (partner) countries*

A less developed (partner) country is a trading partner that is in a lower stage of development than the three main countries. Panel data of trade with less developed partner countries, named Dataset 3, comprise 372 observations. The adjusted R-squared shows 93.6% of the variation in bilateral trade is explained by the model. Distance between pair countries has a strong negative relationship with trade at 1% level of significance, but land common border does not significantly contribute to trade when estimated using this data set.

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As expected, access to loans has a positive relationship with bilateral trade at 1% level of significance. The degree of bilateral trade contributed by access to loans is higher when estimated using this data set compared to using Dataset 2. Access to equity also shows a positive relationship with bilateral trade, significant at 5% level, indicating that trade increases when it is easier for businesses in the two countries to raise capital through the local equity market.

The country credit ratings variable is negatively related to bilateral trade at 1% level of significance, whereas the capital controls variable is positively related to bilateral trade at 1% level of significance. In contrast to the negative result from Dataset 2, the positive coefficient suggests that trade between main countries and less developed partner countries increases when these countries relax their international capital market controls. This result is consistent with trade-vertical FDI model developed by Markunsen (1983) and Neary (1995). The real exchange rates variable shows a negative relationship with bilateral trade at 5% level of significance, indicating that the larger the difference in real exchange rates of pair countries, the less trade occurs between them.

6 Conclusion

This study investigates the relationship between financial development and trade using a gravity model estimated with fixed effects method based on Anderson and van Wincoop (2003) and Baier and Bergstrand (2007). The analysis is based on panel data of bilateral trade between the three main countries (United States, Japan, and Germany) and 47 partner countries for the period 2003 and 2007. The study finds differences when grouping the partner countries into developed and less developed countries affecting the degree of bilateral trade with the main

countries. Physical distance between pair countries generates significant estimations consistent with the literature: main countries trade more with partner countries located close to them.

In all cases, access to loans shows a significant positive relationship with bilateral trade, indicating that trade between countries is higher when it is easier for businesses to obtain loans. Easy access to loans in less developed countries appears to contribute more to the degree of bilateral trade than in developed countries. This result is expected since financial systems in less developed countries are heavily bank based.

Access to equity shows a significant positive relationship with bilateral trade when main countries trade with less developed countries. Equity market development, as well as trade, is often promoted in less developed countries since these countries are usually bank based rather than market based. In contrast, trade between main countries and other developed countries is lower when access to equity is higher. A possible explanation for the negative relationship is that the equity markets in developed countries have high levels of transparency and are thus more efficient than the equity markets in less developed countries. Easy access to highly efficient equity markets in developed countries may encourage multinational companies to substitute trade with investment in local suppliers, lowering the level of trade.

All three international financial indicators (country credit ratings, capital controls, and real exchange rates) have significant relationships with bilateral trade. The three variables appear to affect trade between main countries and less developed partner countries to a lesser degree than when developed countries trade with each other. In all cases, main countries tend to trade more with partner countries with higher credit ratings.

Trade between two developed countries decreases when the countries relax their international capital market controls. This result suggests a substitution between trade and

foreign investment in local companies that serve the local markets, which is consistent with

trade-horizontal FDI model. On the other hand, trade between main countries and less developed

countries increases when these countries relax their capital controls, which is consistent with

trade-vertical FDI model.

Real exchange rate is positively related to bilateral trade when main countries trade with

other developed countries. The positive relationship indicates that the larger the difference in

real exchange rates between two developed countries, the more trade occurs between them. The

rationale for this result may relate to a shift in production location of multinational companies

within developed countries to take advantage of misaligned currency. The opposite is the case

for trade with less developed countries. This result, however, needs to be interpreted with

considerable caution and merits further studies.

In conclusion, this paper finds that there is indeed a significant relationship between

financial development and bilateral trade. The results suggest implications for a country's

policies regarding access to external funds for businesses as well as capital controls and

exchange rates in promoting trade and development, with some differences depending on

whether the country is a developed or less developed country.

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Table 1. List of countries

Main countries	Partner countries
Germany	Algeria
Japan	Australia
United States	Austria
	Belgium
	Bulgaria
	Canada
	Chile
	China
	Colombia
	Costa Rica
	Croatia
	Czech Republic
	Denmark
	Dominican Republic
	Ecuador
	Finland
	France
	Germany
	Greece
	Hungary
	Ireland
	Israel
	Italy
	Japan
	Luxembourg
	Malaysia
	Morocco
	Netherlands
	New Zealand
	Nigeria
	Norway
	Pakistan
	Philippines
	Poland
	Portugal
	Romania
	Russian Federation
	Singapore
	Slovak Republic
	South Africa
	Spain
	Sweden
	Switzerland
	Tunisia
	Ukraine
	United Kingdom
	United States
	Venezuela

Table 2. Variable descriptions and summary statistics

(a) Variable descriptions

Variable	Variable label	Description
TRA_{ijt}	ln(xij+xji/gdpi*gdpj)	xij+xji is trade between country i and country j in million US$
		gdpi(j) is GDP of country i(j) in billion US$
DIS_{ij}	ln(disij)	disij is distance between country i and country j in miles
LCB_{ij}	land common border	1 = share common border, 0 = no common border
DEV_{ijt}	stage of development	1 = same stage, 0 = different stage
LNA_{ijt}	ln(lnai*lnaj)	lnai(j) is score of access to loan of country i(j)
EQA_{ijt}	ln(eqai*eqaj)	eqai(j) is score of access to equity of country i(j)
CCR_{ijt}	ln(max ccri,ccrj/min ccri,ccrj)	ccri(j) is country credit rating of country i(j)
CAP_{ijt}	ln(capi*capj)	capi(j) is capital control in country i(j)
RER_{ijt}	ln(max reri,rerj/min reri,rerj)	reri(j) is real effective exchange rate in country i(j)

(b) Summary statistics

Variable	Observation	Mean	Standard Deviation	Minimum	Maximum
TRA_{ijt}	690	-5.036	1.336	-7.621	-1.754
DIS_{ij}	690	8.540	1.020	5.156	9.843
LCB_{ij}	690	0.0725	0.259	0	1
DEV_{ijt}	690	0.4609	0.499	0	1
LNA_{ijt}	690	2.681	0.339	1.658	3.352
EQA_{ijt}	690	3.395	0.229	2.591	3.728
CCR_{ijt}	690	0.346	0.350	0	1.525
CAP_{ijt}	690	3.642	0.375	2.480	4.345
RER_{ijt}	690	0.210	0.170	0	0.953

Table 3. Regression results

Country-specific by time and country-pair fixed effects[†]

Main countries:		Partner countries		
United States,		(1)	(2)	(3)
Japan, and	TRA_{ijt}	All partner	Developed	Less developed
Germany.		countries	countries	countries
Gravity	DIS_{ij}	-0.643***	-0.483***	-0.794***
		(0.038)	(0.053)	(0.053)
	LCB_{ij}	0.023	0.570***	0.116
		(0.113)	(0.133)	(0.201)
	DEV_{ijt}	-1.321***	---	---
		(0.120)		
External Funds	LNA_{ijt}	0.735***	0.808**	1.097***
		(0.205)	(0.315)	(0.258)
	EQA_{ijt}	0.425**	-1.839***	0.453**
		(0.173)	(0.504)	(0.196)
International	CCR_{ijt}	-0.883***	-1.800***	-0.622***
Finance		(0.157)	(0.531)	(0.181)
	CAP_{ijt}	0.548***	-1.209***	0.588***
		(0.111)	(0.382)	(0.123)
	RER_{ijt}	-0.292	2.779***	-0.776**
		(0.286)	(0.686)	(0.327)
Intercept		-3.349***	8.927***	-3.267***
		(0.665)	(2.320)	(0.782)
Observations		690	318	372
Adjusted R^2		0.937	0.958	0.936

[†] Anderson and van Wincoop (2003) and Baier and Bergstrand (2007).

***,**,* indicate variable is significant at 1%, 5%, and 10% levels, respectively. Standard errors are in parentheses.