Finance and Trade: The Role of Stock Markets and Importers

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Abstract

This paper applies the gravity model of international trade to quantify the impact of the banking sector and the stock market on bilateral trade patterns. Following the study of capital structure, I evaluate the mix of external financing sources used for real investment at the macroeconomic level by differentiating between the relative roles of the banking sector and stock market development in determining trade patterns. Using aggregate bilateral trade data for 87 countries over 1976-2012, I find that stock market development has a substantial impact on trade, distinct from the effect of the banking sector. There is ample evidence to suggest that there is a heterogeneous effect of banking at different levels of stock market development, indicating a substitutability between the banking sector and the stock market as sources of finance. This is true for both the poor and non-poor country samples. Moreover, I find some evidence indicating the importance of the importer's stock market development for bilateral trade after dividing my sample by income groups.

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1. Introduction

What factors cause differences in international trade over time has been one of the most researched topics in international economics. Extensive research has shown that access to financial resources shapes the decisions exporters make, affecting international trade patterns. This paper contributes to that literature by evaluating how the banking sector and the stock market distinctly affect international trade patterns, the heterogeneous effect of banking at different development levels of the stock market, and the role of both exporters' and importers' financial systems in influencing trade.

Earlier theoretical research in international trade has focused on the role of cross-country differences in economies of scale, productivity, and factor endowments in predicting the gains from trade due to comparative advantage. Kletzer and Bardhan (1987) was one of the first papers to discuss that production costs may differ between countries when credit funding or trade finance is needed for real investments, even with identical technology and endowments. Much of the previous theoretical work had assumed perfect financial markets in which firms have access to as much financial capital as needed to take advantage of the most profitable business opportunities. In reality, however, this capital needs to be financed, either internally or externally. In the absence of adequate finance, trade is affected negatively. Financial constraints impede the activities of exporting firms, in particular. Chor and Manova (2012) explain that external finance[1] is important for exporting for various reasons including costs of financing working capital[2] due to time lags associated with shipment and payment,

[1]External financing describes funds that firms obtain from outside the firm, compared to internal financing which consists mainly of profits retained by the firm for investment.

[2]Working capital is calculated as current assets minus current liabilities. It is the capital of a business used to pay for its daily trading operations.

upfront costs associated with exporting abroad, and the costs of export market entrance and maintenance.

One of the earlier empirical papers by Beck (2002) explores the possible link between international trade and financial development to find evidence for the hypothesis proposed in Kletzer and Bardhan (1987). Beck's estimation results show support for their theoretical model: countries with well-developed financial sectors have higher shares of manufactured exports and trade balance in GDP and total merchandise exports. Subsequently Beck (2003) provides evidence that countries with greater reliance on external sources of finance have higher manufacturing trade shares and higher trade balances within industries that use external finance more intensively. Wagner (2014) examines the direction of causality of this link between financial development and international trade and finds evidence that less financially-constrained firms self-select into exporting. Becker et al. (2012) predict that an increase in financial development increases trade (this is especially true when fixed costs are large) and that financial development increases the elasticity of exports with respect to the exchange rate. They measure financial development using private credit and accounting standards (an index of the quality and comprehensiveness of companies' balance sheets and income statements), and up-front costs using bilateral distance. Additionally, they find evidence that the allocation of exports across different importers is more responsive to exchange rates when financial development is higher. Huang and Temple (2005) find strong evidence that an increase in trade is followed by higher financial development in higher-income countries, but not in lower-income countries.

While the literature on the impact of financial development on international trade is extensive, there is a lack of research on the different sources of external finance that affect trade.

Financial development measures the health of the "aggregate" financial system; however, this system itself comprises of distinct sectors like banking and stock markets i.e. different sources of external finance, which potentially have differential effects on bilateral trade patterns. While the trade literature focuses on the overall impact of the financial system on international trade, the corporate finance literature dwells more on the mix of sources of external finance influencing trade patterns. For example, when internal cash flow is not sufficient to fund capital expenditures, how does a firm decide to acquire external finance? The corporate finance literature identifies debt and equity as the two sources of external finance primarily utilized by firms when internal financing is not available. On a macroeconomic level, this is equivalent to a combination of the banking sector and the stock market as sources of finance available in a country.

Opening stock exchanges and equity market liberalizations promote efficient allocation of resources and firm level investment [Mitton (2006)], increase temporary growth at the very least [Minier (2009), Bekaert et al. (2005)], increase aggregate investment levels [Henry (2000)], and reduce the cost of capital [Martell and Stulz (2003), Bekaert and Harvey (2000)]. However, once opened and running, how does the development of these stock markets impact trade patterns? The empirical literature has found causal links between international trade patterns and financial development (mostly identified by measures of banking development), but the impact of stock market size on international trade relative to banking development has been somewhat neglected. An increase in exports is considered to be one of the channels through which growth rates increase. Better allocation of resources, increases in firm-level and overall investment, and a reduction in the cost of capital are positively linked to trade patterns, especially the latter. This paper aims to investigate the relative importance of the

banking sector and stock market development.

The international trade literature has considered the role of exporters' access to finance in determining exports, but has seldom evaluated the role of the importer or the destination country. Ma and Xie (2019) incorporated financial development conditions for both exporting and importing countries in country-pairs to investigate if banking credit of both partners affect the trade patterns between them. However, I evaluate the role of importers' banking development and stock market development, in addition to those of the exporters', in determining bilateral trade. In addition, I introduce interaction terms to find out if banking credit has a heterogeneous effect on trade as stock markets develop. Unlike Ma and Xie (2019), I do this for a full sample of countries and groups of poor and non-poor countries. Ma and Xie (2019) find that importers matter, too: the financial development of the importing or destination country increases the variety of goods being exported (extensive margin) and increases the volume of goods being exported (intensive margin). In addition, the financial development of the exporter and the importer act as substitutes in facilitating bilateral trade.

This paper is the first to consider the relative effects of the banking sector and the stock market using a gravity model and aggregate bilateral trade data. My dataset consists of 87 countries over 1976-2012 and the main findings can be summarized as follows. First, increases in both the exporter country's banking and stock market development are associated with increases in bilateral trade from the exporter to the importer. Additionally, there seems to be a heterogeneous effect of banking credit on trade for countries with less-developed stock markets, compared to well-developed ones, i.e. the positive effect of banking credit on bilateral trade keeps diminishing as stock markets develop and eventually becomes negative. Second, bilateral trade is increasing in banking sector and stock market development for

the poor exporting countries sample as well, and the coefficient estimates are even larger in the case where poor countries are exporting to other poor countries. Third, there is some evidence indicating that the importers' financial systems matter for bilateral trade as well. The effect of a poor country's banking sector and its stock market on exports seem to be complementary to each other. Additionally, an increase in the stock market development of an importer increases trade, for poor and non-poor importers. Fourth, since the primary model utilizes remoteness indexes to account for multilateral resistances instead of the standard exporter-time fixed effects, I re-estimate the impact of the banking sector and the stock market using a method proposed in Heid et al. (2017) as a robustness check. I find some supporting evidence suggesting that both financial sector sectors are together important in determining bilateral trade.

The rest of the paper is as follows: Section 2 discusses the capital structure theory in relation to finance and international trade. Section 3 discusses the empirical specification and challenges associated with identification. Section 4 describes the data and Section 5 discusses the results. Section 6 looks at impact of the two financial sectors by income groups. Section 7 estimates the impact of these sectors using a different method using both international and intra-national trade flows.

2. Capital Structure Theory, Finance, and International Trade

One of the more disputed topics in the corporate finance literature is the capital structure question: What is the ideal combination of debt and equity that maximizes the interest of stakeholders in a firm? Modigliani and Miller (1958) had assumed that capital markets are

perfect and frictionless, and disruptions to the equilibrium can be balanced out by financial innovation. However, capital markets are hardly perfect. When internal financing is not enough to fund business investments, firms naturally opt for external financing and their choice of finance has important implications for firm outcomes.

The corporate finance literature on capital structure focuses on how firms obtain funds to pursue profitable business projects when financial markets are imperfect. Beginning with Myers (1984) and Myers and Majluf (1984), several theories have been formulated and tested to explain the sources of external financing and mix of securities used by corporations. This strand of literature has substantial discussion on internal versus external financing. Foley and Manova (2015) discuss how firms operate in an environment of informational asymmetries and moral hazard. They further elaborate on the cross-country differences in availability of financial capital, how financial markets are not perfectly integrated across borders, and how this can be a source of financial distress. This ushered in speculation on the mix of sources of external financing that firms opt for when internal finance is insufficient. Myers (2001) discusses three major theories in detail: the pecking order theory, the tradeoff theory, and the free cash flow theory, but argues that there is no universal rule to predict financing choices. [3]

Analogously, on a macro level, trade patterns are often reliant on the condition of acquiring adequate external financing as elaborated by trade papers like Chor and Manova (2012). Finding adequate financing is important for the decisions of exporting firms than non-exporting firms. Wagner (2014) adds that the direction of this link between financial development and international trade usually finds that less constrained firms self-select into

[3] Feidakis and Rovolis (2007) find evidence for a number of factors that determine firms' financing-choice behavior, namely firm size, industry, country, profitability, growth opportunities, liquidity, macroeconomic issues etc.

exporting. Rajan and Zingales (2001) state that as the financial system develops and physical collateral becomes less important, industries can raise finance more easily. Hence, a natural question arises: are exports more responsive to some sources of finance more than others? Much of the corporate finance research on the theory of capital structure focuses on the debt-equity choice. Following the pecking order theory, this paper focuses on two primary sources of finance: debt and equity. At the macro level, this translates to the banking sectors and stock markets facilitating increases in trade value. The study of capital structure that introduces the idea of firm preference over financing choice also suggests that the banking sector and the stock market may affect trade flows differently. Most of the growth and trade literature uses domestic credit to the private sector[4] as a measure of financial development, excluding the stock market. I incorporate both private credit and stock market capitalization to allow for the distinct effects of these two components of financial development.

3. Data

The data for this paper include 87 countries spanning 1976-2012 and have been assembled from multiple sources. The bilateral trade data, export value in thousands of dollars, is from UN COMTRADE have been retrieved from the World Integrated Trade Solution (WITS). The finance variables, GDP, and population are from the World Development Indicators database of the World Bank. The two finance variables chosen for this paper, one for the banking sector and another to measure that impact of the stock market, have been selected following Levine and Zervos (1998). For banking development, I include the domestic credit to the

[4]This is more commonly known as private credit.

private sector as a percentage of GDP, *Banking Credit*. It measures the value of loans made to the private sector by banks and other depository institutions. For stock market development, I include the market value of shares for listed domestic companies as a percentage of GDP, *Market Capitalization*. Capitalization measures the size of the stock market and has been used in the literature as a measure of stock market development. WTO membership status of each bilateral pair has been downloaded from the WTO website. $EIA_{i,j}$[5] is a multichotomous index (0-6) retrieved from the NSF-Kellogg Institute Data Base on Economic Integration Agreements. Data on average weighted distance, to calculate the remoteness indexes between countries has been downloaded from the CEPII database.

Table 1 depicts the summary statistics for selected variables (trade and financial) used in this paper and Table 2 shows the correlations between the financial variables and ln GDP of exporting and importing countries. All non-categorical variables are in natural logs. Over time, between 1976 and 2012, banking credit has increased by approximately 2 standard deviations of its mean, while market capitalization has increased by around 3 standard deviations of its mean value. This is due to many stock exchange openings since 1989. Minier (2009) finds 55 stock exchanges opened between 1976-1998. While banking credit and market capitalization are correlated positively, the correlation is about 0.60, suggesting that they may have distinct effects on trade volume.

[5]For $EIA_{i,j}$, 0 denotes no existing Economic Integration Agreement, 1 denotes a One-Way Preferential Trade Agreement, 2 denotes a Two-Way Preferential Trade Agreement, 3 denotes a Free Trade Agreement, 4 denotes a Customs Union, 5 denotes a Common Market, and 6 denotes an Economic Union.

Table 1: Summary Statistics of Variables of Interest: Full Sample

Variable	Obs	Mean	Std. Dev.	Min	Max
Export	59,834	10.852	3.415	-6.908	19.680
BankCredit_i	59,834	4.026	0.803	-1.681	5.521
BankCredit_j	59,834	3.990	0.821	-1.681	5.494
MarketCap_i	59,834	3.672	1.086	-3.080	7.134
MarketCap_j	59,834	3.646	1.111	-3.080	7.134
WTO	59,834	0.852	0.355	0	1
EIA	59,834	0.962	1.571	0	6
Population	59,834	16.713	1.614	0	21.019
GDP	59,834	25.758	1.747	0	30.375
Remoteness Indices:					
- Exporters	59,834	23.615	0.317	0	24.008
- Importers	59,834	23.339	0.432	0	23.959

Note: All non-categorical variables are in natural logs as in the regressions. i and j have been used to denote exporters and importers, respectively.

Table 2: Correlations between Financial Variables and GDP: Exporters

	$BankCred_i$	$MarketCap_i$	$LnGDP_i$
$BankCred_i$	1		
$MarketCap_i$	0.6217	1	
$LnGDP_i$	0.4315	0.4028	1

4. Empirical Specification: The Gravity Model

The structural gravity model provides a framework for partial and general equilibrium analysis to identify factors that drive differences in bilateral trade. In the gravity model, the value of trade between any two countries is directly proportional to the size of the trading partners' economies and inversely proportional to the total bilateral trade cost between each bilateral pair. After controlling for size, bilateral and multilateral trade barriers, and time and country-pair fixed effects, the panel gravity regression framework for 87 countries pooled over 1976-2012 can be represented as follows:

$$\begin{aligned}\ln export_{i,j,t} =& \beta_0 + \beta_1 \ln Bankcred_{i,t} + \beta_2 \ln Bankcred_{j,t} + \beta_3 \ln MCap_{i,t} + \beta_4 \ln MCap_{j,t} \\ &+ \beta_5(\ln Bankcred_{i,t} \times \ln MCap_{i,t}) + \beta_6(\ln Bankcred_{j,t} \times \ln MCap_{j,t}) \\ &+ \beta_x X_{i,t} + \beta_x X_{j,t} + \mu_{i,j} + \lambda_t + \epsilon_{i,j,t}\end{aligned} \tag{1}$$

where i denotes exporter, j denotes importer, and t denotes time in years. $\ln export_{i,j,t}$ is the natural log of the bilateral export value; $bankcred_{i,t}$ denotes the banking sector development of the exporter country and $bankcred_{j,t}$ denotes the banking sector development of the importer country. This variable is measured by the domestic credit to the private sector as a percentage of GDP and will be referred to as banking or bank credit for the rest of the paper. $MCap_{i,t}$ and $MCap_{j,t}$ denote the stock market development of the exporter and the importer country, referred to as market capitalization in the remainder of the paper. This is measured using the market value of shares for listed domestic companies as a percentage

of GDP. ($\ln bankcred_{i,t} \times \ln MCap_{i,t}$) denotes an interaction term between banking credit and market capitalization of exporters which will help explain the effect of the exporter's banking sector on bilateral trade as the stock market develops, referred to as the exporter's interaction term in this paper, and likewise for the importer's interaction term.

$X_{i,t}$ and $X_{j,t}$ are vectors that contain exporter-, importer-, and bilateral pair-specific control variables like the natural log of Gross Domestic Product ($GDP_{i,t}$, $GDP_{j,t}$) and population ($Pop_{i,t}$, $Pop_{j,t}$) to control for country-level directional characteristics of exporters and importers that vary over time, regional trade agreements ($EIA_{ij,t}$), and WTO membership ($WTO_{ij,t}$) that control for bilateral pair characteristics that vary over time. EIA (Economic Integration Agreement) is an index variable that denotes the level of economic integration between each bilateral trading partner over time and WTO equals one if both trading partners are WTO members, zero otherwise. The two terms also include $ln\_REM\_EXP_{i,t}$ and $ln\_REM\_EXP_{j,t}$ that denote the natural log of remoteness indexes[6] constructed to capture the multilateral resistances faced by the exporters and importers over time.

$\mu_{i,j}$ is the bilateral country-pair fixed effect term included to capture the time-invariant bilateral trade costs affecting trade like bilateral distance, common currency, common languages, and common religions between bilateral pairs. λ_t denotes the time-fixed effects term that captures and $\epsilon_{i,j,t}$ is the random error term.

[6] As demonstrated by Anderson and Van Wincoop (2003), in the absence of multilateral resistances terms in gravity regressions, variable estimations may lead to biases. Therefore, following Yotov et al. (2016), the remoteness indexes are constructed as the logarithms of output- and expenditure-weighted averages of distance between trading partners i and j:

$$\ln REM\_EXP_{i,t} = \ln \big(\sum_{j} DIST_{ij} / \frac{E_{j,t}}{Y_t} \big)$$

$$\ln REM\_EXP_{j,t} = \ln \big(\sum_{i} DIST_{ij} / \frac{E_{i,t}}{Y_t} \big)$$

A major challenge in estimating gravity models is determining the associated bilateral trade costs. The standard practice to account for these trade costs is to proxy for them using a list of observable variables: bilateral distance, dummy variables to capture common languages, common currency, common religions, regional trade agreements (RTAs), the presence of colonial ties, and an indicator variable for contiguous borders. However, including regional trade agreements raises the potential for endogeneity of trade policies within the gravity model, simply because these trade policies are likely to suffer from reverse causality i.e. negotiating an RTA might be influenced by the increasing trade between two trading partners. For example, profitable trade between two countries may cause them to self-select into more liberalized trade. Baier and Bergstrand (2007) and later Agnosteva et al. (2014), Egger and Nigai (2015), and Yotov et al. (2016) suggest including country-pair fixed effects in the regression equation to account for the correlation between the RTA variable and the error term. Including country-pair fixed effects absorbs the effect of all bilateral time-invariant variables like common languages, distance etc. and obviates the need to include them in the gravity equation.

Another challenge in estimating the gravity equation is accounting for the *multilateral resistances* facing each bilateral pair, as opposed to the bilateral trade resistances like distance that are being captured by including country-pair fixed effects. The idea of multilateral trade resistances is that trade between any two trading partners can not only be affected by the bilateral trade resistances between them, but also by the average trade resistances they face from the rest of the world i.e. two countries will trade more with each other the further they are from the rest of the world. For example, Australia and New Zealand trade in substantial quantities since they are physically close, and therefore experience low

bilateral trade resistance. However, the trade between them is also affected by how remote they are from the rest of the world, creating high multilateral resistances. Hence, Australia trades more with New Zealand than it would if they were located in the middle of Europe. Gravity equations suffer from omitted variable bias if this resistance is not accounted for. This is why the literature suggests adding multilateral resistance terms to gravity model estimations. Anderson and Van Wincoop (2003) and Baldwin and Taglioni (2006) highlight the importance of including multilateral resistance terms. Multilateral resistance terms are theoretical constructs, therefore, measures for these terms are not directly observable. Yotov et al. (2016) concludes that the best way to account for multilateral resistance is by including exporter-time and importer-time fixed effects in panel data. Anderson and Van Wincoop (2003) recommends not using remoteness indexes since these terms do not completely account for multilateral resistances leading to estimates suffering from upward bias. However, since the primary explanatory variables of interest (the financial variables) are country-time variables, exporter- and importer-time fixed effects cannot be included in the regression framework. Instead this paper aims to capture multilateral resistance by incorporating remoteness indexes for the exporter and the importer. This is a major limitation of this model, because in the absence of country-time fixed effects, the model is unable to absorb any other country-specific time-varying and unobservable characteristics of both the exporters and importers.

There are three aspects of the relationship between finance and trade that could be extracted from the above empirical specification. The first is the relative importance of the banking sector and the stock market for bilateral flows, represented by the coefficients on banking credit and market capitalization of the exporter country. The second item of interest is the role of the importer's banking credit and market capitalization in bilateral

trade flows. Statistically significant and positive coefficients on the importer's banking credit and capitalization would indicate the importance of financially developed trading partners for the exporting country. The final component is the heterogeneous effect of banking credit at different levels of capitalization, which can be captured by the interaction term between the two finance variables. This aspect of the finance-trade relationship has not been studied in the previous literature but holds important implications for trading countries by providing more insight on the impact of diversified financial systems on trade flows.

4.1. Endogeneity of Financial Policy

Although the endogeneity of trade policy from including regional trade agreements has been addressed by including country-pair fixed effects, the possibility of endogeneity associated with financial variables is a concern. It is possible that countries aiming to increase export value self select into developing their respective financial systems, leading to issues of reverse causality. Some papers in the previous literature have looked into causality running from exports to finance as well. Greenaway et al. (2007) finds that participating in export markets improves financial health of exporting firms. A good way to control for this reverse causality is by including exporter- and importer-time fixed effects. However, that is not a possibility since all finance variables are country-time. Therefore, to help eliminate endogeneity to a certain extent, I use lagged explanatory variables for regression equation (1). The contemporaneous export value may affect contemporaneous banking credit and capitalization, but is less likely to affect the previous period's banking credit and market capitalization.

4.2. Alternative Specifications

As robustness checks, I estimate my model using the following alternative specifications:

Heteroskedasticity of the Trade Data and Zero Trade Flows: Poisson Pseudo Maximum Likelihood Estimation. Recent developments in the empirical gravity literature have endorsed the various properties of Poisson Pseudo Maximum Likelihood (PPML) estimation, and it has become common in the trade literature to use PPML. Silva and Tenreyro (2006) pointed out that trade data is associated with heteroscedasticity, which causes estimates of trade costs and trade policy in gravity models to become biased and inconsistent when the gravity model is estimated in log-linear form using the OLS estimator. They also suggest that the PPML estimator is able to extract meaningful information associated with zero trade values which OLS would otherwise drop. Although the main specification in this paper is not estimated in a log-linear form and the number of zero trade flows is relatively very low, I estimate my specification using PPML estimation for comparison.

Gravity Estimation with Country Fixed Effects. As an alternative specification, I estimate my model using time-invariant exporter and importer fixed effects and gravity covariates (instead of country-pair fixed effects) for comparison. This approach has been used by Ma and Xie (2019) to look at the impact of overall financial development. However, first, the inclusion of time-invariant country fixed effects does not help in capturing the changes in the fixed effects over time. Second, gravity covariates are not completely able to soak up all the time-invariant country-pair characteristics, as with pair-fixed effects.

Two-stage Estimation of Gravity Equation. A group of papers in the literature have estimated the gravity equation using the two-stage estimation approach to estimate the impact

of unilateral country- and time-specific policies on international trade using panel data. First, the gravity model is estimated using the country-time fixed effects without including the country-time specific variables of interest (my finance variables), and then second, the fixed values of the fixed effects from the first step are regressed on the variables of interest (which could not be included in the first step). The two-step approach has been criticized because of a lack of research on its asymptotic properties [Heid et al. (2017)]. Moreover, in the latter step, country-specific variables are perfectly collinear with the multilateral resistances, and therefore, the effects of any country-specific variables like income and multilateral resistances terms cannot be extracted from the unilateral policies in the two-step regression approach.

5. Empirical Results: The Impact of Finance on Trade

Table 3 presents the impact of banking sector development and stock market development on annual bilateral export value estimated using using OLS. All non-categorical variables are in natural logs to interpret the results as elasticities, and all regressions include time-fixed effects and country-pair fixed effects. All regressions include natural logs of GDP and population of both exporter and importer countries, WTO, EIA, and remoteness indexes as control variables. Column (1) depicts a typical regression often studied in the trade literature showing the impact of the exporter's banking credit on export value. This effect is positive but not statistically significant. Column (2) adds the second measure of finance, market capitalization, to the regression to capture the impact of the exporter's stock market on exports separately from the impact of the banking sector. *Ln market capitalization* is strongly positively correlated with export value and is statistically significant. However, there

may be some interaction between the two measures of finance and, therefore, to capture the underlying relationship, Column (3) adds an interaction term between the exporters' banking credit and market capitalization. Adding an exporter's interaction term allows for the possibility of identifying substitutability between the two sources of external finance on a macroeconomic level. Studies that focus on the thresholds of banking development and equity markets have emphasized how banking development typically occurs before stock market development in the process of economic development. Boyd and Smith (1998) develop a theoretical model and explain that equity markets may develop in countries at later stages of economic development and eventually increase economic performance once a threshold level of economic and banking development has been achieved. The interaction terms help identify the role that the two finance sectors play in influencing exports as advancements in both sectors take place.

In this paper, I also examine the impact of the importer's banking sector and stock market development on trade value. The previous literature has primarily focused on the effects of exporter side banking development on trade. The regression in Column (4) represents the primary specification for this paper. Regressions (1)-(3) are restricted to the sample in Regression (4) to allow for more direct comparisons.[7] Regression (4) adds the importer's financial variables to capture the importance of the destination country's financial system on trade value, and estimated coefficients for the exporters are almost identical to (3). The regression results show that the banking and stock market development of the exporter indeed matter for trade value. The PPML specification which has increasingly become popular in the empirical trade literature has been included in Regression (5) for comparison. The

[7]Results are similar for Regressions (1)-(3) when no sample restrictions are imposed.

dependent variable of Poisson Pseudo-Maximum Likelihood (PPML) specification is the bilateral trade value (not logged) between the exporter and the importer, as required by the specification[8]. Regression (6) includes another alternative specification for comparison where traditional gravity variables like distance, dummy variables for contiguous borders, common language, common colony, and current colony have been included instead of pair-fixed effects, in addition to exporter-, importer-, and time-fixed effects. The middle panel of Table 3 shows the implied marginal effect of the exporters' banking credit at different percentiles of market capitalization.

The main results in Regression (4) of Table 3 support the hypothesis that countries with more developed banking sectors and stock markets export more. The coefficients on banking credit and market capitalization are both small but positive and statistically significant. Estimates of both the exporter side variables are positive and statistically significant in most specifications. Estimates from the PPML estimation in Regression (5) are lower than the main results in (4) which may be due to missing time-varying country fixed effects. The estimates in Regression (6) are higher than those in (4) possibly indicating that the traditional gravity variables were unable to absorb all time-invariant bilateral pair characteristics in the absence of pair-fixed effects.

Regression (4) of Table 3 also includes estimation results on the impact of importers' banking credit and market capitalization on bilateral export flows. The coefficients are

[8]The main objective of using the PPML method is that we do not have to take log of exports. Additionally, OLS estimation is unable to take into account the information within the zero trade values because they are simply dropped during the regression process. Logging of exports leads to biased and inconsistent estimates. Furthermore, trade data is known to suffer from heteroscedasticity, again leading to biased and inconsistent estimates. Silva and Tenreyro (2006) discuss that the PPML estimation is able to effectively take care of the heteroscedasticity and take into account the information within the zero trade values.

Table 3: Panel Gravity Regressions of Finance and Trade

Variable	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) PPML	(6) OLS
BankCred_i	0.0276	0.0259	0.381***	0.381***	0.238***	0.427***
	(0.021)	(0.021)	(0.059)	(0.059)	(0.078)	(0.061)
BankCred_j				0.031	0.019	0.050
				(0.049)	(0.059)	(0.055)
MCap_i		0.0357**	0.442***	0.444***	0.374***	0.507***
		(0.017)	(0.062)	(0.062)	(0.120)	(0.065)
MCap_j				0.0878	0.166**	0.0107
				(0.055)	(0.075)	(0.061)
BankCred_i*MCap_i			-0.112***	-0.112***	-0.0662**	-0.136***
			(0.016)	(0.016)	(0.030)	(0.017)
BankCred_j*MCap_j				0.00232	-0.00132	0.0245
				(0.014)	(0.018)	(0.016)
Marginal Effect of BankCred_i:						
At P10: MCap_i			0.127***	0.128***	0.089***	0.121***
			(0.028)	(0.028)	(0.027)	(0.029)
At Median: MCap_i			-0.040*	-0.039*	-0.009	-0.081***
			(0.021)	(0.021)	(0.046)	(0.024)
At P90: MCap_i			-0.173***	-0.171***	-0.087	-0.241***
			(0.032)	(0.032)	(0.078)	(0.037)
Pair FE	Yes	Yes	Yes	Yes	Yes	No
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Exporter & Importer FE	No	No	No	No	No	Yes
N	59834	59834	59834	59834	60118	59834
R-sq	0.936	0.936	0.937	0.937		0.808

Notes: Standard errors are clustered by bilateral pairs. Standard errors in parentheses with ***, **, and * denoting significance at the 1%, 5%, and 10% levels respectively. The dependent variable is the ln of annual bilateral trade value, except for (5), where the trade value is not logged. All specifications include logs of GDP and population of both exporter and importer countries, and WTO, EIA, and remoteness indexes as control variables. Regression (6) includes traditional gravity covariates like ln of bilateral distance, common currency etc.

positive across all specifications indicating the importance of the importers' financial system for trade, however, the coefficients are mostly statistically insignificant. Only in the case of the PPML estimation in (5) is there some evidence linking the importers' stock market and bilateral trade. Ma and Xie (2019) showed that better-developed financial systems of importers are associated with a higher volume and increased variety of exports. While their results may hold at the extensive and intensive margins, contrary to their findings, this analysis shows that there is not enough evidence to conclude that the importer's banking and stock market development affect bilateral trade value overall.

The underlying relationship between an exporter's banking credit and market capitalization and how how these interact to influence bilateral trade introduces important narratives of heterogeneity into the finance-trade relationship. The coefficient of the interaction is negative and statistically significant in all specifications at least at the 95% level. This means that there is a possibility of substitutability between these two sectors as sources of external finance. The middle panel of Table 3 shows that at lower levels of market capitalization, the marginal effect of ln *bankcred* on ln *export* is positive. With higher market capitalization, the marginal effect of ln *bankcred* keeps decreasing and eventually becomes negative. This means that in countries with less developed stock markets, the banking sector plays an important role in increasing export value. However, the marginal impact of the banking sector on exports is eventually negative as stock market development increases. In Regression (3), the marginal effect of capitalization on exports is positive only for levels of capitalization below 31.1%, and approximately 45% of the sample has market capitalization below 31.1%.

This is consistent with Demirgüç-Kunt and Levine (1996) and Boyd and Smith (1998) who contend that countries at earlier stages of economic development depend more on the

banking sector for increasing trade but further increases in economic performance beyond a certain threshold are associated with more sophisticated financial advances. This analysis finds further evidence that the two financial sectors can act as substitutes in affecting trade.

In other words, an increase in banking credit has a smaller effect on trade value in countries with highly developed stock markets than in countries with less-developed stock markets. This aspect has not been studied in previous literature and sheds new light on the finance-trade relationship. The interaction term appears less significant for importers.

There are three main conclusions we can draw from Table 3. First, market capitalization has a significant impact on export value, in addition to banking credit. This emphasizes the importance of stock market development which appears to be at least as important as banking sector development. Second, there is an interaction between the exporter's banking credit and market capitalization indicating the decreasing importance of the banking sector in increasing bilateral trade and a possibility of substitutability of these two sources of finance. Third, there is no evidence to suggest that banking credit of the importer matters for trade but there is some evidence that market capitalization of the importing country matters, although the effect is not as strong as that of the exporting country.

While the results in Table 3 suggest that the relationship between banking credit and exports may depend on the level of stock market development, the analysis includes countries at all income levels. Previous work has shown that many economic relationships vary by overall development level, so in the next section, I consider poor and non-poor exporters.

6. Impact of Finance on Bilateral Trading Partners: By Income Groups

In this section, I address the implications of increased banking and stock market development for different income groups. Poor and rich countries are at different stages of economic development, meaning that overall economic and financial structures in these countries are different (Demirgüç-Kunt and Levine (1996), Boyd and Smith (1998)). While poor countries are more likely to be reliant on the banking sector, richer countries have additional financial resources stemming from more developed stock markets. This is evident when comparing summary statistics between income groups. Comparing average levels of banking credit and market capitalization between poor and non-poor countries, on average, non-poor countries have levels of market capitalization 32% higher, and banking credit 18% higher than that of poor countries.

Demirgüç-Kunt and Levine (1996) provide evidence that equity markets tend to grow in countries at advanced stages of economic development and may be unnecessary for less developed countries, both in terms of financial and economic standing. Greenwood and Smith (1997) explain that developing stock markets are associated with additional costs that are feasible for richer or more developed countries. Boyd and Smith (1998) develop a theoretical model and describe that equity markets may be superfluous for countries at earlier stages of economic development but eventually increase economic performance once a threshold level of economic and financial development has been achieved. Minier (2003) finds a positive correlation between economic growth and market capitalization for high-income

countries, but not for low-income countries. Therefore, the impact of financial systems on international trade between an exporting and an importing country may depend on the income levels and financial structure of both countries. The World Bank classifies countries by income[9] into four primary groupings: low, lower-middle, upper-middle, and high. The World Bank provides annual income thresholds for all these groups. I use the World Bank income classifications to divide countries into non-poor (high-income and upper-middle-income) and poor (lower-middle-income and low-income) countries.

6.1. The Case of Poor Exporters vs Non-Poor Exporters

Table 4 presents results for poor and non-poor exporters. Regression (1) presents results for poor exporters and Regression (2) presents results for non-poor exporters. Estimates from Regression (1) reemphasize the importance of banking and the stock market for poor exporting countries as sources of external finance. The coefficient of the exporter's interaction term is negative and statistically significant at the 99% level, indicating that the influence of banking development on trade is lower for countries with bigger stock markets.

While poor exporters have been more thoroughly examined by the literature, the comparison between poor and non-poor exporters may provide additional insights. In both Regressions (1)and (2), the coefficients of both banking credit and market capitalization are positive and statistically significant at least at the 95% level. The exporter's interaction term of both regressions is negative and statistically significant at the 99% level indicating

[9]Income is measured using gross national income (GNI) per capita, in U.S. dollars, converted from local currency using the World Bank Atlas method.

that there might be some degree of substitutability between banking and stock markets. For further insight, I look at the marginal effect of banking credit at different levels of market capitalization i.e. how does the effect of banking on exports change as stock markets develop? For poor exporters, the marginal effect of banking credit is positive and statistically only at the 10th percentile of capitalization. This reaffirms the importance of banking in increasing trade of a poor country that is at early stages of economic development. For non-poor exporters, the marginal effect of banking credit is positive at the 10th percentile of capitalization but are negative at the median and the 90th percentile at the 99% level of statistical significance. This suggests that, in non-poor countries, banking sectors increase exports up to certain threshold of capitalization, but as stock markets develop further, banking sectors become less important for increasing exports.

A comparison of marginal effects of banking credit at different percentiles of capitalization between poor and non-poor exporters shows that there is evidence of a heterogeneous impact of banking credit for non-poor exporters but not for poor exporters. This could have important implications for financial reform policies devised by international organizations that have maintained that improving financial systems in poor countries may help achieve growth and trade targets faster. There has been a surge in the stock exchange openings in developing countries since the 1970s. Results from this table indicate perhaps increasing economic performance in poor countries might be more difficult than opening up stock exchanges and that the banking sector still remains an important determinant for increasing trade in poor countries, while it becomes less important for increasing trade in non-poor countries as stock markets develop.

Table 4: Impact of Finance on Trade: Poor vs Non-Poor Exporting Countries

Variable	(1)	(2)
Exporters:	Poor	Non-Poor
BankCredit_i	0.400***	0.517***
	(0.098)	(0.080)
BankCredit_j	0.0771	0.0261
	(0.128)	(0.052)
MarketCap_i	0.302**	0.619***
	(0.118)	(0.092)
MarketCap_j	0.157	0.0943
	(0.132)	(0.060)
BankCredit_i*MarketCap_i	-0.084***	-0.149***
	(0.031)	(0.023)
BankCredit_j*MarketCap_j	-0.0203	-0.00012
	(0.035)	(0.015)
Marginal Effect of BankCredit_i:		
At P10: MarketCap_i	0.256***	0.121***
	(0.079)	(0.025)
At Median: MarketCap_i	0.141	-0.072***
	(0.086)	(0.022)
At P90: MarketCap_i	0.039	-0.230***
	(0.106)	(0.041)
N	14,575	45,045
R-sq	0.913	0.948

Notes: Standard errors are clustered by bilateral pairs. Standard errors in parentheses with ***, **, and * denoting significance at the 1%, 5%, and 10% levels respectively. The dependent variable is the ln of annual bilateral trade value. All specifications include logs of GDP and population of both exporter and importer countries, and WTO, EIA, and remoteness indexes as control variables.

6.2. The Case of Poor Exporters

Table 5 presents results for only poor exporting countries. Regression (1) presents results for the situation when a poor country exports to all importing countries, the same as Regression (1) of Table 4. Regression (2) of Table 5 presents coefficients for the situation when a poor country exports to another poor country, and the estimates are larger than that of the all importers sample. The difference in the magnitudes between banking credit and market capitalization is small, however, the more interesting thing is that these estimates are much larger than the corresponding estimates in Table 3. The exporter-interaction term between a poor exporter's banking credit and market capitalization is negative and statistically significant indicating that there could be a heterogeneous effect of banking credit. However, the marginal effects of banking credit are statistically insignificant at all three levels of capitalization. There is no evidence to suggest that the export value of a poor exporter is affected by the banking of a poor importing country.

Regression (3) presents estimates for when poor countries are exporting to non-poor countries. The coefficient on the importer's capitalization is positive and statistically significant at the 90% level, indicating that bilateral trade increases as the poor-exporting countries trade with non-poor countries with more developed stock markets. This is intuitive because non-poor countries with better developed financial systems are likely to import more. Results from this column suggest that a poor country's export value to a non-poor country depends on the former's banking development. This provides further support for the importance of

Table 5: Impact of Finance on Trade: Poor Exporting Countries

Variable	(1)	(2)	(3)
Importers:	All	Poor	Non-poor
BankCred_i	0.400***	0.545***	0.367***
	(0.098)	(0.191)	(0.116)
BankCred_j	0.0771	-0.191	0.242
	(0.128)	(0.171)	(0.199)
MCap_i	0.302**	0.586**	0.149
	(0.118)	(0.233)	(0.146)
MCap_j	0.157	-0.265	0.379*
	(0.132)	(0.163)	(0.220)
BankCred_i*MCap_i	-0.084***	-0.191***	-0.0296
	(0.031)	(0.062)	(0.037)
BankCred_j*MCap_j	-0.0203	0.1000**	-0.0769
	(0.035)	(0.045)	(0.056)
Marginal Effect of BankCred_i:			
At P10: MCap_i	0.256***	0.224	0.316***
	(0.079)	(0.146)	(0.102)
At Median: MCap_i	0.141	-0.029	0.275**
	(0.086)	(0.157)	(0.117)
At P90: MCap_i	0.039	-0.259	0.240*
	(0.106)	(0.198)	(0.145)
N	14,575	3,826	10,698
R-sq	0.913	0.905	0.920

Notes: Standard errors are clustered by bilateral pairs. Standard errors in parentheses with ***, **, and * denoting significance at the 1%, 5%, and 10% levels respectively. The dependent variable is the ln of annual bilateral trade value. All specifications include logs of GDP and population of both exporter and importer countries, and WTO, EIA, and remoteness indexes as control variables.

the banking sector for poor countries, as in Regression (2). Furthermore, there is no evidence indicating the importance of the non-poor country's banking and stock market development for a poor country's exports. Lastly, statistical insignificance of the interaction terms provide no proof to suggest that either the poor exporter or the non-poor importer's banking sector and stock market work as substitutes to influence trade.

The lower panel of Table 5 notes the implied marginal effect of bilateral exports with respect to the banking credit of the exporter at the median level of market capitalization. For the case when poor countries are exporting to all countries, the marginal effect of banking credit at the median level of capitalization is 0.141 indicating that further increases in banking credit increase trade value. The lower panel of Regression (3) shows that the implied marginal effect for the poor exporter-non-poor importer case is 0.275 implying that when the same poor exporters are trading with non-poor countries, banking sector development still plays a big role in influencing trade between them.

6.2.a. *The Marginal effect of Banking Credit at the 10th and 90th Percentiles for Poor Exporters: By Income Groups.–* Calculating the marginal effect of banking credit for the 10th and 90th percentiles of market capitalization for different income groups yields different results compared to that for the full sample. All results are calculated for 2012. Table 6 shows the marginal effects.

Among poor exporters, an example of a low-capitalization country (at the 10th percentile of market capitalization) is Nigeria, and a high-capitalization country (at the 90th percentile) is the Philippines. In the case of a poor exporter and a poor importer, the marginal effect

Table 6: Marginal Effect of Banking at Percentiles of Capitalization: Poor Exporters

	Poor Exporter		
	Exporter	Capitalization	Marginal Effect
Poor Importer	Nigeria	2.252	0.116
			(0.145)
	Philippines	4.299	-0.274
			(0.202)
	Exporter	Capitalization	Marginal Effect
Non-Poor Importer	Nigeria	2.252	0.301
			(0.105)
	Philippines	4.299	0.240*
			(0.145)

of banking credit for Nigeria is positive while that for the Philippines is negative, although neither is statistically significant. The marginal effect becomes zero and subsequently negative when ln of market capitalization is 4.106, which translates to a market value of shares for listed domestic companies as a percentage of GDP of 60.73%. Roughly 54% of the exporters in the regression sample fall below this level of capitalization. In the case of a poor exporter and a non-poor importer, the marginal effects of banking credit for Nigeria and for the Philippines are both positive and nearly identical in magnitude. This implies that when a poor country is exporting to a non-poor country, banking development is positively correlated with exports irrespective of the level of capitalization of the poor exporting country.

6.3. The Case of Non-Poor Exporters

Table 7 shows results for non-poor exporters only. Regression (1) repeats results for the situation when a non-poor country exports to all importing countries for comparison, the same as Regression (2) of Table 4. Regression (2) of Table 7 shows the case a non-poor

country exports to a poor country. It again shows the importance of the banking sector and stock market for non-poor countries that export to non-poor countries. Moreover, there is evidence to indicate that the banking sector and stock market of a non-poor exporter act as substitutes for sources of finance when exporting to a poor country. The surprising result is the negative and statistically significant (at the 95 % level) coefficient on the poor importers' capitalization suggesting that having more developed stock markets is correlated with lower imports. Lastly, the interaction term between a poor importer's banking credit and capitalization becomes positive and statistically significant in this regression suggesting that the two sectors complement each other as sources of finance for a poor country as an importer. This is in contrast to the previous results that found no evidence to suggest that the importer's finance choices were either substitutes or complements in influencing exports. Therefore, increases in stock market development in a poor country actually accentuate the increasing impact of the banking sector on its imports. This is an interesting finding because finance sectors of the exporter have been found to be substitutes in influencing trade in both the finance and trade literatures but in the case of non-poor exports to poor importers, the importer's financing sectors complement each other.

Regression (3) presents the case when a non-poor country exports to another non-poor country. The exporter-side regression results are consistent with the all-country sample: the impact of developments in the exporter's stock market tend to increase trade value, in addition to the banking sector. The exporter's interaction term indicates that banking and stock markets are substitutes in influencing export value. This regression reaffirms the importance of the stock market in non-poor countries and how the impact of the banking sector on exports lessens as the stock market develops further. Lastly, there is no evidence to

suggest that the importer's finance sectors act as substitutes in affecting export trade value.

The lower panel of Table 7 notes the implied marginal effect of bilateral trade with respect to the banking credit of the exporter for non-poor countries at median level of market capitalization. For the case when non-poor countries are exporting to all countries, the marginal effect of banking credit at the median level of capitalization is -0.072 indicating that further increases in banking credit become less important in influencing export value. Estimates show that beyond a threshold level of of 30.6% of GDP, market capitalization matters more for increasing exports for the non-poor exporters[10].

The difference in the marginal effects reflects how sources of external financing could affect exports differently depending on the income levels of the importing country. Although income levels are positively correlated with all sources of external finance, they are not perfectly correlated, and the marginal effects vary between regressions owing to the variation in financial development within the group of non-poor exporting countries. Some countries in the non-poor income group have financial systems that are comparable to those of some poor countries. For example, Argentina classified as a non-poor country has banking credit and market capitalization of 2.64 (14% of GDP) and 2.11 (8% of GDP) which are similar to that of Ghana, classified as a poor country.

[10]Regression (2) shows that the implied marginal effect for the non-poor exporter-poor importer case is positive and statistically insignificant at 0.013. For the non-poor exporter-non-poor importer case in Regression (3), the marginal effect at the median of capitalization is negative and statistically significant at -0.099 meaning that for non-poor exporting countries with median level of stock market development, further improvements in the banking sector become less important for increasing export value when exporting to other non-poor countries as the stock market becomes more indispensable for increasing trade value.

Table 7: Impact of Finance on Trade: Non-Poor Exporting Countries

Variable	(1)	(2)	(3)
Importers:	All	Poor	Non-poor
BankCred_i	0.517***	0.519***	0.498***
	(0.080)	(0.190)	(0.090)
BankCred_j	0.0261	0.0869	0.036
	(0.052)	(0.085)	(0.084)
MCap_i	0.619***	0.497**	0.639***
	(0.092)	(0.219)	(0.103)
MCap_j	0.0943	-0.174**	0.204**
	(0.060)	(0.083)	(0.104)
BankCred_i*MCap_i	-0.149***	-0.126**	-0.151***
	(0.023)	(0.053)	(0.026)
BankCred_j*MCap_j	-0.00012	0.0606**	-0.017
	(0.015)	(0.024)	(0.025)
Marginal Effect of BankCred_i:			
At P10: MCap_i	0.121***	0.171***	0.097***
	(0.025)	(0.056)	(0.029)
At Median: MCap_i	-0.072***	0.013	-0.099***
	(0.022)	(0.046)	(0.025)
At P90: MCap_i	-0.230***	-0.121	-0.258***
	(0.041)	(0.090)	(0.046)
N	45,045	11,487	33,416
R-sq	0.948	0.937	0.953

Notes: Standard errors are clustered by bilateral pairs. Standard errors in parentheses with ***, **, and * denoting significance at the 1%, 5%, and 10% levels respectively. The dependent variable is the ln of annual bilateral trade value. All specifications include logs of GDP and population of both exporter and importer countries, and WTO, EIA, and remoteness indexes as control variables.

6.3.a. *The Marginal effect of Banking Credit at the 10th and 90th Percentiles Non-Poor Exporters: By Income Groups.–* Calculating the marginal effect of banking credit for the 10th and 90th percentiles of market capitalization for different income groups yields similar results as that for the full sample. Table 8 shows the marginal effects.

Table 8: Marginal Effect of Banking at Percentiles of Capitalization: Non-Poor Exporters

	Non-Poor Exporter		
	Exporter	Capitalization	Marginal Effect
Poor Importer	Cyprus	2.337	0.139
			(0.075)
	Luxembourg	4.725	-0.034
			(0.070)
	Exporter	Capitalization	Marginal Effect
Non-Poor Importer	Cyprus	2.337	0.032
			(0.035)
	Luxembourg	4.725	-0.131**
			(0.042)

A non-poor exporter exports either to a poor importer or to a non-poor importer; for both cases the low-capitalization country at the 10th percentile of market capitalization is Cyprus while the high-capitalization country at the 90th percentile is the Luxembourg. In the case of a non-poor exporter and a poor importer, the marginal effect of banking credit for Cyprus is positive and the that for Luxembourg is negative. This means that a non-poor exporter with low capitalization relies more on banking development to increase exports compared to a non-poor exporter with high capitalization. The marginal effect is zero when ln of market capitalization is 4.259 which translates to a market value of shares for listed domestic companies as a percentage of GDP of 70.73%. Roughly 85% of the regression sample falls below this level of capitalization. In the case of a non-poor exporter and a non-poor importer,

the marginal effect of banking credit for Cyprus is positive but close to zero and that for Luxembourg is negative. A marginal effect of close to zero makes sense because Cyprus is already at advanced stages of economic and banking development, in addition to a growing stock market. In case of exporting to a non-poor importer, the marginal effect becomes zero and subsequently negative when ln of market capitalization is 2.807 which translates to a market capitalization of 16.56%. Roughly 22% of the exporters in the regression sample fall below this level of capitalization, meaning that most of the exporters have high stock market development. This suggests that exports of non-poor countries that export to poor countries tend to be influenced by banking development even at high levels market capitalization while diminishing returns to banking development sets in at lower levels of market capitalization for those that export to other non-poor countries. This indicates that non-poor countries that rely more on stock markets for finance tend to export to other non-poor countries while those that rely more on the banking sector tend to export to poorer countries.

Dividing the sample by income groups into poor and non-poor categories further explained the relationship between finance and trade. Consistent with the all-country sample results from Table 3, exports from non-poor countries is reliant on both banking and stock market development. On the contrary, exports from poor countries mostly depends more on banking. This is also consistent with the analogy that countries at different stages of economic development depend on different aspects of the overall financial sector. A poor exporter's stock market development matters when it is trading with another poor importer but not when it is trading with a non-poor importer. Exports from a non-poor country to a poor country depend on how developed the importer's banking sector is. Interestingly, increases in stock market development in a poor country increase the impact of the banking sector on its

imports as they act like complements in increasing export value of the non-poor country.

7. Aggregate Manufacturing Sector Data: International and Intra-national Trade Flows

The structural gravity model has become prevalent and popular in the empirical trade literature to study the effects of various policies on trade flows owing to its successful identification of such trade policies. However, despite its increasing success, the gravity equation cannot be used to extract the effect of any unilateral or non-discriminatory trade policies or any other non-trade policies at the country level. As Head and Mayer (2014) noted, that effect of these policies cannot be estimated using the structural gravity equation because the exporter- and importer-time fixed effects would completely absorb them due to perfect collinearity, but need to be included to account for multilateral resistances as per Anderson and Van Wincoop (2003).

This aspect of the gravity model constitutes a challenge in the quantification of the impact of unilateral non-trade policies and financial variables like banking credit and market capitalization as well. In fact, a good number of variables are associated with unilateral measures which could uncover some important trade relationships. As is true for this analysis, the estimates and corresponding interpretations of the previous tables may need to be interpreted with caution because of missing directional time-varying fixed effects.

7.1. Data and Identification Strategy

As a solution to these challenges, Heid et al. (2017) designed a simple and theoretically consistent method to extract the effects of unilateral or non-discriminatory trade policies on international trade, even in the presence of exporter-time and importer-time fixed effects. This method can be applied to non-trade policies and variables like banking credit and capitalization as well. To begin, their solution incorporates the usage of *intra-national* in addition to international trade flows. This means that the financial variables can be identified even in the presence of country-time fixed effects because the intra-national observations provide the variation required for identification since the financial variables will only apply to international trade and not domestic trade.

Following Heid et al. (2017), the specification for this section is as follows:

$$\ln export_{ijt} = \beta_1 \ln BankCred_{it} \times I_{ij} + \beta_2 \ln MCap_{it} \times I_{ij} + \gamma GRAV_{ijt} + \eta_{it} + \mu_{jt} + \epsilon_{ijt}, \forall i, j \quad (2)$$

where $\ln export_{ijt}$ denotes the nominal trade flows from exporter i to importer j at time t. The difference between this dataset and the one used earlier in this paper is that this also includes internal trade data (X_{iit}). I_{ij} is an International dummy equal to 1 for international trade and equal to 0 for intra-national trade. The variables of interest are the financial variables interacted with the International dummy: $BankCred_{it} \times I_{ij}$ and $MCap_{it} \times I_{ij}$. $GRAV\_ijt$ is a vector including all standard time-varying trade determinants[11] and time-invariant gravity covariates[12] Following Heid et al. (2017), I will replace $GRAV_{ijt}$ with pair

[11] regional trade agreements

[12] international border dummies to capture globalization effects, common currency, common colony, common language, current colony, log of bilateral distance etc.

fixed effects in some regressions for experimentation. η_{it} and μ_{jt} denote the sets of exporter- and importer-time fixed effects to capture any time-varying country-specific determinants of trade and multilateral resistances. ϵ_{ijt} is the error term. Errors are clustered at the exporter and importer level.

The trade data for this section is from the Yotov et al. (2016) book constructed to include both international and intra-national trade flows assembled by Thomas Zylkin. The original sources of this dataset are the UN COMTRADE database and CEPII TradeProd database The final balanced panel dataset covers the aggregate manufacturing sector of 69 exporters and importers over the period 1986-2006.

7.2. Empirical Results

Table 9 presents results for the main specification (from Equation 1) in Regression (1). Regressions (2)-(5) of Table 9 presents the results for the proposed method to identify estimates of the impact of unilateral variables banking credit and market capitalization, even in the presence of exporter- and importer-time fixed effects. Following Heid et al. (2017), I estimate this specification using both OLS and PPML techniques. Using traditional gravity variables in regressions (2) and (3), I obtain positive and statistically significant estimates for both financial variables which suggests that both bank credit and market capitalization are jointly important for influencing international trade. In terms of economic magnitude, estimates from (2) indicates that a 10% increase in bank credit increases trade by 11.7% while the same increase in capitalization increases trade by 0.65%. Estimates from OLS estimations in (2) and (4) are, in general, larger than those from PPML estimations in (3) and (5). The estimates for bank credit are no longer statistically significant when controlling

for bilateral pair fixed effects in regressions (4) and (5).

Table 9: Panel Regressions: Using International & Intra-national Trade Flows

	(1) OLS_Int	(2) PPML_Int	(3) OLS_Int	(4) PPML_Int
International	-11.23***	-8.374***	0	0
	(1.22)	(0.47)	(.)	(.)
BankCred_i*International	1.173***	0.911***	-0.0277	-0.00104
	(0.31)	(0.12)	(0.14)	(0.07)
MCap_i*International	0.651***	0.184**	0.140**	0.122***
	(0.25)	(0.08)	(0.07)	(0.03)
Intra-national Trade Flows	Yes	Yes	Yes	Yes
Exp- & Imp-time FE	Yes	Yes	Yes	Yes
Pair FE	No	No	Yes	Yes
N	44762	45885	44594	45636
R-sq	0.868		0.957	

Notes: Standard errors are clustered by bilateral pairs. Standard errors in parentheses with ***, **, and * denoting significance at the 1%, 5%, and 10% levels respectively. The dependent variable is the ln of annual bilateral trade value for Regressions (1) and (3), and trade value (not logged) for Regressions (2) and (4). All specifications include standard gravity covariates.

8. Robustness Checks

8.1. Estimation of Panel Data with Intervals

The adjustment of trade flows in response to advancement in the financial system is unlikely to be instantaneous. In addition, the financial variables do not vary substantially from year to year. Yotov et al. (2016) points out that the adjustment of trade flows is likely to be more challenging in specifications using fixed effects. Trefler (2004) suggests

against estimating trade equations pooled over consecutive years. Cheng and Wall (2005) explained that fixed-effects estimations using panel data pooled over years is criticized because dependent and independent variables cannot fully adjust in a year's time. Overall, the trade literature recommends experimenting with alternative intervals in order for allow for bilateral trade flows to adjust over time in response to changes in trade costs. Trefler (2004), Baier and Bergstrand (2007), and Anderson and Yotov (2016) use intervals to estimate trade equations. Olivero and Yotov (2012) find evidence that estimations using intervals provide consistent estimated across different intervals compared to panel data pooled over consecutive years. Therefore, this section estimates the gravity equation using different intervals.

Table A.9 in the appendix presents results for gravity estimation using 3-year, 4-year, and 5-year intervals, comparing it to the main results from the pooled dataset in Column (1). The estimates using intervals are larger compared to the the main results.

9. Conclusion

The effects of banking sector and stock market development on bilateral trade flows using bank credit and market capitalization have been examined in this paper, utilizing aggregate bilateral trade flows and a panel data approach for 87 countries over 1976-2012.

For the full sample of countries, I find that banking credit and market capitalization both matter for increasing bilateral trade values. In addition, I find that banking has a heterogeneous effect on bilateral trade: in countries with lower stock market development, bank credit affects trade more than in countries with high stock market development. This suggests, in the absence of well-developed stock markets, countries rely more on the banking

sector, and substitution occurs as the stock market develops. For the poor exporters' sample, I find that both financial variables matter for increasing trade, and there is weak evidence of the heterogeneous impact of bank credit, especially, because countries in those sample are relatively less developed economically and financially. The equity markets in those countries have not developed enough for that substitution to occur. Finally, for the non-poor exporters' sample, again both financial variables matter for increasing bilateral trade, and since the coefficients are comparable, I find some evidence suggesting that equity matters more than debt especially when non-poor countries are trading with other non-poor countries. Ample evidence indicates a heterogeneous effect of bank credit at various levels of capitalization.

Novel evidence suggests that in poor countries, banks and stock markets are complements rather than substitutes. This is consistent with theoretical literature that suggests that it is important for poor countries to establish banking sectors first, and establishment of equity markets are reinforced in the presence of well-developed banking sectors. I find additional evidence that suggests that capitalization matters for increasing bilateral trade on the importer side when the importer is a non-poor country, regardless of the exporter being poor or non-poor.

Lastly, to measure robustness of this model that does not allow utilizing time-varying country-specific fixed effect, this paper uses a novel method proposed in Heid et al. (2017) to identify the impact of the two financial variables on bilateral trade flows. I find evidence that partially supports the conclusions from the main model. I find that banking credit and market capitalization do indeed both matter for increasing bilateral trade flows, and estimations of the effects of financial systems on trade should include both these variables to allow for the distinct effects that they have on international trade.

10. Data Appendix

10.1. Data Descriptions

$EIA_{i,j}$ is a multichotomous index (0-6) retrieved from the NSF-Kellogg Institute Data Base on Economic Integration Agreements, where 0 denotes no existing Economic Integration Agreement, 1 denotes a One-Way Preferential Trade Agreement, 2 denotes a Two-Way Preferential Trade Agreement, 3 denotes a Free Trade Agreement, 4 denotes a Customs Union, 5 denotes a Common Market, and 6 denotes an Economic Union.

10.2. List of Countries

Table 10: List of Poor Countries

Bangladesh	Ghana	Kenya	Pakistan	Sri Lanka
Brazil	India	Malaysia	Paraguay	Thailand
Bulgaria	Indonesia	Mexico	Peru	Tunisia
China	Jamaica	Morocco	Philippines	Turkey
Colombia	Jordan	Namibia	Romania	Ukraine
Ecuador	Kazakhstan	Nigeria	South Africa	Zambia
				Zimbabwe

Table 11: List of Non-Poor Countries

Argentina	China	Greece	Malta	Poland	Switzerland
Australia	Colombia	Hungary	Mauritius	Portugal	Thailand
Austria	Costa Rica	Ireland	Mexico	Qatar	Trinidad and Tobago
Barbados	Croatia	Israel	Namibia	Romania	Tunisia
Belgium	Cyprus	Italy	Netherlands	Russian Fed.	Turkey
Botswana	Czech Republic	Jamaica	New Zealand	Singapore	United Arab Emirates
Brazil	Denmark	Japan	Norway	Slovenia	United Kingdom
Bulgaria	Finland	Kazakhstan	Oman	South Africa	United States
Canada	France	Luxembourg	Panama	Spain	Uruguay
Chile	Germany	Malaysia	Peru	Sweden	

10.3. Additional Tables

Table A.1: Summary Statistics: Poor vs Non-Poor Exporters

Variable	Poor	Non-Poor
Log of Banking Credit_EXP	3.388	4.221
Log of Banking Credit_IMP	3.976	4.001
Log of Capitalization_EXP	2.922	3.856
Log of Capitalization_IMP	3.605	3.600
N	11,812	36,517

Table A.2: Summary Statistics: Poor Exporters and Poor Importers

Variable	Obs	Mean	Std. Dev.	Min	Max
Log of Banking Credit_EXP	3,077	3.35829	0.760976	1.624044	5.11502
Log of Banking Credit_IMP	3,077	3.309689	0.773014	1.576538	5.11502
Log of Capitalization_EXP	3,077	2.824796	1.178511	-3.08002	5.461172
Log of Capitalization_IMP	3,077	2.791391	1.176852	-3.08002	5.461172

Table A.3: Summary Statistics: Poor Exporters and Non-Poor Importers

Variable	Obs	Mean	Std. Dev.	Min	Max
Log of Banking Credit_EXP	8,686	3.397132	0.724287	1.624044	5.11502
Log of Banking Credit_IMP	8,686	4.214214	0.730474	-1.6811	5.493947
Log of Capitalization_EXP	8,686	2.956407	1.120714	-3.08002	5.461172
Log of Capitalization_IMP	8,686	3.897588	0.887676	0.244023	5.787998

Table A.4: Summary Statistics: Non-Poor Exporters and Poor Importers

Variable	Obs	Mean	Std. Dev.	Min	Max
Log of Banking Credit_EXP	9,057	4.22036	0.72943	-1.6811	5.493947
Log of Banking Credit_IMP	9,057	3.357509	0.74316	1.576538	5.11502
Log of Capitalization_EXP	9,057	3.909854	0.891185	0.244023	5.787998
Log of Capitalization_IMP	9,057	2.919193	1.140008	-3.08002	5.461172

Table A.5: Summary Statistics: Non-Poor Exporters and Non-Poor Importers

Variable	Obs	Mean	Std. Dev.	Min	Max
Log of Banking Credit_EXP	27,326	4.220159	0.711389	-1.6811	5.493947
Log of Banking Credit_IMP	27,326	4.215817	0.713175	-1.6811	5.493947
Log of Capitalization_EXP	27,326	3.837152	0.916536	0.143226	5.787998
Log of Capitalization_IMP	27,326	3.829432	0.933805	-0.96067	5.787998

Table A.6: Correlations between Financial Variables and GDP

	$BankCred_i$	$BankCred_j$	$MarketCap_i$	$MarketCap_j$	$LnGDP_i$	$LnGDP_j$
$BankCred_i$	1					
$BankCred_j$	0.0115	1				
$MarketCap_i$	0.6217	0.0046	1			
$MarketCap_j$	0.0054	0.6105	0.0269	1		
$LnGDP_i$	0.4315	0.0154	0.4028	0.0077	1	
$LnGDP_j$	0.0229	0.4521	0.0087	0.3913	0.0139	1

Table A.9: Panel Gravity Regression of Finance and Trade: 3-, 4-, 5-year Intervals

Variable	(1)	(2)	(3)	(4)
	Main	3-Year	4-Year	5-Year
BankCred_i	0.381***	0.422***	0.514***	0.690***
	(0.059)	(0.091)	(0.119)	(0.137)
BankCred_j	0.031	0.147	0.163	0.083
	(0.049)	(0.084)	(0.110)	(0.131)
MCap_i	0.444***	0.524***	0.582***	0.672***
	(0.062)	(0.096)	(0.113)	(0.125)
MCap_j	0.0878	-0.129	0.126	0.0459
	(0.055)	(0.083)	(0.105)	(0.120)
BankCred_i*MCap_i	-0.112***	-0.139***	-0.152***	-0.195***
	(0.016)	(0.024)	(0.030)	(0.034)
BankCred_j*MCap_j	0.00232	-0.00455	-0.0154	0.00748
	(0.014)	(0.021)	(0.028)	(0.032)
N	59,834	21,922	16,988	12,842
R-sq	0.937	0.940	0.946	0.952

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