CESifo Working Papers

Financial System Architecture and the Patterns of International Trade

Emmanuel Amissah
Spiros Bougheas
Fabrice Defever
Rod Falvey

CESIFO WORKING PAPER NO. 5960
CATEGORY 8: TRADE POLICY
JUNE 2016

ISSN 2364-1428

CESifo *Working Paper No. 5960*

Financial System Architecture and the Patterns of International Trade

Abstract

Countries differ on the extent to which their financial system relies on banks or on the financial market. We offer a model featuring a possible two way relationship between countries' financial system architecture and their comparative advantage. Countries specialising in bank dependent sectors favour the development of the banking sector. Simultaneously, countries with more efficient capital markets develop comparative advantage in sectors with strong dependence on market finance. To empirically investigate our model's predictions, we construct a measure of sector bank dependence and establish a strong relationship between countries' comparative advantage and their financial system architecture.

JEL-Codes: F100, G200, G210.

Keywords: financial systems, trade patterns, banks, direct finance.

Emmanuel Amisssah
Nottingham Trent University
Burton Street
United Kingdom – Nottingham NG1 4BU
emmanuel.amissah@ntu.ac.uk

*Spiros Bougheas**
University of Nottingham
University Park
United Kingdom – Nottingham NG7 2RD
spiros.bougheas@nottingham.ac.uk

Fabrice Defever
University of Nottingham
University Park
United Kingdom – Nottingham NG7 2RD
fabrice.defever@nottingham.ac.uk

Rod Falvey
Bond University
Gold Coast
Australia – QLD 4229
rfalvey@bond.edu.as

*corresponding author

June 2016
We would like to thank participants at various seminars and conferences and in particular Pol Antras, Peter Egger, Kalina Manova, Chris Milner, Doug Nelson, Andrei Levchenko and Jiandong Ju for helpful comments and suggestions.

1. Introduction

Recent research in international trade has unveiled a strong relationship between international trade patterns and financial development. In particular, it has been established that for countries with deeper financial development their exports are dominated by goods produced by financially dependent sectors.[1] Moreover, the causality of this relationship seems to bi-directional. While Beck (2003) and Manova (2013) provide evidence suggesting that countries' financial development may act as a source of comparative advantage and therefore shape trade patterns, Do and Levchenko (2007) offer support for the reverse link, namely, financial development is itself influenced by comparative advantage. According to the first explanation comparative advantage is driven by technology: countries that have a technological comparative advantage in sectors that depend on external finance have a stronger incentive to develop their financial system. In contrast, the second explanation suggests that comparative advantage is driven by institutional quality: countries with better quality financial institutions have deeper financial development and thus support the promotion of financially dependent sectors.

The treatment of financial markets in the above literature is basic. It fails to recognize not only the variety of financial sources potentially available to firms but also the cross-country variation in their relative development. These variations are well documented by Allen and Gale (2001) who highlight the differences between on the one hand the USA and Britain with their well-developed capital markets and on the other hand Japan, Germany and France where traditionally banks have provided the main financial support for firms. These differences might have something to do with the industrial advantages enjoyed by these countries. For example, in the USA with its emphasis on the development of new technologies a well-functioning capital market encourages the dispersion of new information while in Germany and Japan the predominance of manufacturing suggests that intermediary finance is more suitable for dealing with standardized information.[2]

In this paper we take a close look at the link between financial system architecture and the patterns of international trade. If the Allen and Gale (2001) conjecture is true then we should be able to identify a relationship between a country's predominant source of domestic funds and its patterns of exports. Therefore, our first step is to check if the hypothesized link

[1] There are many related theoretical contributions (for examples, see Antras and Caballero, 2009; Beck, 2002; Chaney, 2013; Ju and Wei, 2011; Kletzer and Bardhan, 1987; Matsuyama, 2005; Wynne, 2005). None of these papers make a distinction between financial sources which is the main focus of our work.
[2] See also Allen and Gale (1999).

is borne out in the data for OECD members, that is, countries at sufficiently high stages of financial and economic development. To do so, we propose a novel sectoral indicator of external finance dependence that captures the relative dependence of each sector between bank and market finance. Our methodology is similar to the one used by Rajan and Zingales (1998). However, instead of measuring the external finance dependence of each sector, our variable captures the sectoral relative dependence on each of the two source of finance, i.e. bank finance and market finance. Using this new indicator, we document a strong and significant relationship between cross-country differences in financial system architecture and export patterns. The exporting sectors of countries where bank finance is the dominating external finance source are those that relatively depend more heavily on bank finance. In contrast, for countries where market finance is stronger their exporting sectors are those sectors for which bond and equity finance is relatively more important.[3] Clearly, finding support for the conjecture does not also provide an explanation for the relationship between financial market architecture and the patterns of international trade.

With this in mind we develop and analyse a theoretical model of an open two-sector Holmström and Tirole (1997) economy where both bank and market finance co-exist.[4] Entrepreneurs in both sectors need external finance and can obtain it either from the capital market or from intermediaries who provide, in addition to external funds, monitoring services. The ability of entrepreneurs to obtain external finance and the source of funds depend on the level of their endowments of the unique input in production. Credit rationing arises in the model in order to mitigate moral hazard. Only those entrepreneurs with sufficiently high endowments can obtain funds from the capital market. Some of those entrepreneurs unable to access the capital market might be able to obtain finance from banks albeit at a higher cost.

Our method of analysis follows Antras and Caballero (2009). One difference between their set up and ours is that they are only concerned about financial constraints and not the source of finance and thus in their case it is sufficient to work with homogeneous agents

[3] The qualification ‘relatively’ in the last two sentences is important. On average, bank dependence would be much higher in countries where bank finance is more prominent relative to direct finance. When comparing sectors, what matters is the ratio of bank to direct finance and not the values.

[4] There is a well-established literature offering a variety of explanations for the co-existence of bank debt and direct finance in closed economies (for example, see Allen and Gale, 1999; Besanko and Kanatas, 1993; Bhattacharya and Chiesa, 1995; Bolton and Freixas, 2000; Boot and Thakor, 1997; Boyd and Smith, 1998; Chemmanur and Fulghieri, 1994; Dewatripont and Maskin, 1995; Diamond, 1991; Repullo and Suarez, 1997; Von Thadden, 1995). For our work we opted for the Holmström and Tirole (1997) framework because it has been straightforward to work with its two-country extension.

while we need to introduce heterogeneity to allow for differences in the ability to access each type of finance.

We begin by differentiating the two sectors so that one sector is relatively more bank-dependent. The idea here is that the sectors that are relatively more bank-dependent are the same in all countries. Thus, the optimal financial source depends on the nature of the technology. Starting from a position where two countries are identical so that their relative price is the same and, hence, international trade is absent, we introduce a technological advantage in one of the two sectors in one of the two countries. We show not only that this country will have a comparative advantage in that sector but also that it will develop relatively more than the other country the financial market on which that sector is relatively more dependent. Next, starting once more from the symmetric position we weaken the efficiency of the banking system in one of the two countries. Now, we find not only that the country with the lower quality banking system ends up with a relatively less developed banking sector but also that it has a comparative disadvantage in the bank-dependent sector. In both cases we find an association between financial architecture and the patterns of international trade but in one case the driver is technology while in the other case it is the relative quality of financial institutions. Therefore, our model identifies two distinct mechanisms that are consistent with an association between financial market architecture and export patterns.

Our final step is to return to the empirics and assess if there is any support in the data for either/both of the mechanisms identified by our theoretical work. We begin by looking for any effects of financial market development on trade patterns. As in Manova (2008), we use the dates of equity market liberalization for each country in our sample to identify exogenous shifts in financial development. While Manova (2008) shows that the liberalization of equity markets have a stronger effect on the exports of sectors that are more dependent on external finance, we complement her finding by identifying a stronger effect for sectors that depend relatively more on equity markets. Thus, our results offer support for the second mechanisms identified by our theoretical work.

We then look at the impact of countries' trade patterns on the development of their banking sector relative to their financial market. By following the instrumental variable strategy of Do and Levchenko (2007), we construct an instrument using the estimated effect of geography variables on trade volumes across sectors. Do and Levchenko (2007) evaluate how a country's external finance requirement given its export pattern affects its external financial development. Instead, we show that a country's bank finance requirement affects the development of its banking sector relative to its financial market, providing support for our first theoretical mechanism. Taking all together, our empirical findings show the complex interactions between a country's financial architecture and its sectoral export patterns, where both our theoretical mechanisms could be at play.

Our work complements a number of studies that examine the link between financial market architecture and economic performance. For example, Black and Moersch (1998), Demirguc-Kunt and Levine (2001) and Levine (2002) focus on the potential influence of financial market architecture on economic growth. Similarly, Rajan and Zingales (1998) and La Porta *et al.* (2000) identify the quality of the legal system and its associate contracting environment as key determinants of economic performance. Lastly, Tadesse (2002) suggests that bank systems serve better economies in their early stages of development where the vast majority of firms are of very small size.

2. Are Financial Systems and Trade Patters Linked?

Our aim in this section is to find if there is any support in the data for the Allen and Gale (2001) hypothesized link between financial system architecture and the patterns of international trade. According to their work, efficient matching between the sources of external finance and the various sectors of the economy depends on the technological characteristics of each sector that, in turn, determine the types of frictions that the corresponding contracting environment will have to overcome. Therefore, our first task is to construct an index that ranks sectors according to their relative use of bank finance compared to market finance.

2.1. Bank Finance Dependence Index

The construction of our measure of sectoral bank dependence follows the methodology developed by Rajan and Zingales (1998). While their index ranks sectors according to their overall external finance requirements our index will rank sectors according to their reliance on bank loans relative to funds raised in debt and equity markets.

We use firm's balance sheet information from the Standard and Poor's Compustat North America database. The database hosts over 24,000 publicly traded companies in the United States. The sample employed included all non-financial firms listed on the stock exchange during the period 1976-2004. Publicly listed companies provide arguably more reliable and complete information concerning their income and balance sheet statement as they have to follow stringent reporting requirements laid down by the Security and Exchange Commission.

For each firm and for each year we derive the ratio of outstanding bank loans to the total amount of outstanding external finance.[5] Our measure strictly follows the methodology used by Rajan and Zingales (1998). We sum across the whole period each firm's average short term borrowing received from banks and then divide by the sum of each firm’s total external finance to obtain each firm’s bank finance dependence. As in Rajan and Zingales (1998), we turn the firm-level information into a unique sectoral indicator of Bank Finance Dependence (BFD) by taking the median firm’s value for each sector as the indicator of the sector’s bank finance dependence. We then convert the 4 digit SIC industry level Compustat data to the 3-digit ISIC revision 3 industry level.[6] The bank dependence index is presented in Table 1 for the 28 3-digit ISIC sectors.

[Please insert Table 1 about here]

There is a strong implicit assumption behind the methodology used by Rajan and Zingales (1998) and in the present paper. The rankings of sectors across countries according to any of the measures of financial dependence are the same as those for US. Given that in this paper, we concentrate on OECD countries, this is probably not a major drawback. As long as the choice of finance in countries with well-functioning institutions is driven by technological considerations, as the corporate finance literature suggests (e.g. Allen and Gale, 2001), and the choice of technology in each sector is similar across countries then we would expect similar rankings. This may not be the case in non-OECD countries where the market finance is poorly developed and firms rely predominantly on banks for their external financial needs.

---

[5] The exact definition provided by Compustat for the variable used for the numerator is as follows: “… this item represents the approximate average aggregate short-term financing outstanding during the company’s reporting year. Short-term borrowings are usually in the form of lines of credit with banks.” The external finance measure represents finance obtained from both banks and the capital market. It includes average short term borrowing, debt senior convertible, debt subordinated convertible, debt debentures, and preferred stock. Debt senior convertible is the part of long term debt that represents the balance sheet amount of outstanding senior convertible debt. Debt subordinated convertible is the part of long term debt that represents the balance sheet amount of outstanding subordinated and convertible debt. Debt debenture is also part of long term debt with the condition to pay back the principal and the interest as stated which is not convertible or subordinated. Preferred stock represents the balance sheet amount of stated value of redeemable and non-redeemable preferred shares issues.

[6] We use the Haveman’s concordance table to convert from 4-digit SIC revision 3 industry level to 4-digit ISIC revision 3 industry level and the United Nations concordance table to aggregate from 4-digit ISIC to 3-digit ISIC revision 2 industry level .

2.2. Cross-Section Analysis: Methodology and Data

In this section, we use the BFD index to estimate the relationships between cross-country differences in financial system architecture and the patterns of international trade among OECD countries. Our methodology follows Beck (2003) and Svaleryd and Vlachos (2005) and relies on the interaction between sectoral intensity in bank finance, captured by our new index, and countries' predominant source of domestic funds. At the country level, variations in financial system architecture are captured by the development of the banking sector relative to the development of equity and bond markets. The supposition is that in countries where the banking sector is more prominent than market finance, the export leading sectors ought to be those sectors that rely relatively more on bank loans for funding their activities.

We estimate the following model:

$$X_{ci} = \alpha_0 + \beta_1(BANDEV_c \times BFD_i) + \beta_2(BANDEV_c \times EFD_i) + \gamma_c + \gamma_i + \varepsilon_{ci}$$

Our dependent variable X_{ci} is a measure of the log of export for country c in industry i. It measures the export flows at the 3 digit SITC Revision 2 classification from the Trade and Production Database complied by Nicita and Olarreaga (2006). The trade data are collected from the United Nations trade statistic database (Comtrade). Using a concordance table, they converted the data from SITC Revision 2 to ISIC 3 digit level Revision 2. The unit of measurement used for the export flows is the value of shipment in US dollars representing the value of exports of the reporting country. This data is available for 28 sectors for the year 2000.

$BANDEV_c$ is a measure of banking development for country c. The variable captures the relative size of the banking sector compared to the size of the whole financial system and is measured using the Beck, Demirguc-Kunt and Levine (2009) dataset. For each country-year, we provide a measure of the share of funding provided by the banking sector in the total amount of external finance provided by both markets and intermediaries. The size of the banking sector is measured as the total value of deposit money bank assets. We measure the variable in the denominator in two different ways that provide two alternative indicators. In BankDev1, we estimate the denominator by adding the value of the numerator and the value of stock market capitalization, while in BankDev2 we also add the private bond market capitalisation to the denominator. Table 2 presents the variables BankDev1 and BankDev2 for United States, UK, France, Japan and Germany for the year 2000.

Table 2: Bank Development in 2000.

COUNTRY	**BankDev1**	**BankDev2**
United States	0.255	0.178
United Kingdom	0.399	0.377
France	0.497	0.426
Germany	0.688	0.543
Japan	0.735	0.638

BFD_i is the index derived above and measures the dependence of sector i on bank finance. Given that it does not vary with time we do not include BFD on its own in the regression as it is captured by the industry fixed effect. As a control variable, we also include the interaction between a sector's total external finance dependence (EFD), as measured by Rajan and Zingales (1998). $\gamma_c, and\, \gamma_i$ are the country and industry specific effects, respectively. Given that both our sectoral variables (BFD and EFD) and the country specific variable BankDev do not vary with time we do not include them in the regression as they are captured respectively by the industry and the country fixed effects.

2.2. Cross-Country Analysis: Results

Table 3 presents the results obtained from our sample of 30 OECD countries for the year 2000. Columns I and III use our first indicator of banking development (BankDev 1) while columns II an IV rely on our second indicator (BankDev 2). An alternative way to check the robustness of the results obtained above is to ensure that the bank finance dependence indicator is not capturing the overall external finance dependence of a sector. Columns III and IV include the interaction between a country's bank development and External Finance Dependence. The sign of this interaction term (BankDev*EFD) is negative but non-significant. More importantly for us, the introduction of the second interaction term only marginally affects our results. When considering a country with a similar level of bank development to that of Japan (BankDev1 = 0.735, see Table 2), the coefficient β_1 estimated in column I implies that a sector relying solely on bank finance (BFD = 1), is associated with an increase of trade by 160 percent compared to a sector relying only on market finance (BFD = 0). This increase will only be of 56 percent in a country with a similar financial architecture to that of the US (BankDev1 = 0.255).

Table 3: Export Patterns, Financial Architecture and Bank Dependence

Bank Development measure	*BankDev1*	*BankDev2*	*BankDev1*	*BankDev2*
	I	**II**	**III**	**IV**
Bank Development * Bank Finance Dependence (BFD)	2.189*** (0.645)	2.043*** (0.619)	2.067*** (0.709)	1.780*** (0.676)
Bank Development * External Finance Dependence (EFD)			-0.354 (0.565)	-0.766 (0.556)
# Observations	839	839	839	839
R-squared	0.835	0.834	0.835	0.835

The dependent variable is the log of exports to the rest of the world by each 3-digit ISIC sector for the year 2000. The Bank Finance Dependence variable is defined in section 2.1. All regressions include a constant term, year and exporter-sector fixed effects. Robust standard-errors reported in parentheses. ***, **, *, indicate significance at the 1%, 5%, and 10% level.

We consistently estimate a strongly positive and highly significant coefficient for the interaction term ($\beta_1 > 0$) thus finding support for the Allen and Gale (2001) conjecture, that is, the exports of countries with a high level of banking sector development are dominated by sectors that are more reliant on bank finance.

We have conducted several robustness checks for which we omit the detailed results in the main text. Notably, the estimations presented in Table 3 have been produced for each year between 1994 and 2004. Furthermore, we have clustered the standard errors either at the country or at the industry level. The coefficient β_1 remains positive and significant at least at the 10 percent level in all these specifications. These robustness checks are presented in Appendix 2.

3. The Model

We present a two-country model with heterogeneous agents that offers two, potentially complementary, interpretations of the patterns identified in the last section.

Consider a two-sector ($j = 1, 2$) economy populated by a continuum of agents of mass 2. Agents differ according to (a) their endowments of capital, A, the only input in the production of the two goods, and (b) their sector-specific skills. Half the agents (unit mass) have skills specific to sector 1 and the other half have skills specific to sector 2. The distribution of endowments among the agents of each skill-type is uniform with support on the interval $[0,\ 1]$. All agents are risk-neutral and have identical homothetic preferences allocating half of their income on each good.

There are two production technologies. The first technology is a simple deterministic CRS technology that is available to all agents. One unit of physical assets invested in this technology yields one unit of good 1 and one unit of good 2.[7] The second technology is stochastic and sector specific. Only agents with skills specific to sector j can use the sector j technology. Production in each sector requires a fixed investment of $I(> 1)$ units of capital. The technology either succeeds and yields Y^j units of consumption or fails in which case it yields nothing. Following the Holmström and Tirole (1997) model we assume that the probability of success depends on the behavior of the entrepreneur. When the entrepreneur exerts effort the probability of success is equal to θ while when she shirks the probability of success is equal to 0, however, in the latter case she derives an additional benefit B^j, that is sector dependent. We assume that the stochastic technology is more productive than the CRS technology only when entrepreneurs exert effort i.e. $\theta P^j Y^j > I \sum_j P^j$, and below otherwise, i.e. $B^j < I \sum_j P^j$, where P^j denotes the price of the consumption good produced by sector j.

In this economy agents have the following three choices. Firstly, they can invest their endowment in the CRS technology. Secondly, they can invest their endowments either in the capital market or in a bank. Thirdly, they can invest in the stochastic technology by borrowing additional assets from lenders. Those agents who invest in the stochastic technology need to obtain external finance to cover the difference between the level of investment and their endowments, $I - A$. They can potentially raise funds by either issuing debt in the capital market or by obtaining loans from banks.[8] Both the capital market and the banking system are competitive. Let R denote the endogenous equilibrium interest rate in the capital market.

All lenders can verify the outcome of each project but cannot observe the level of effort exerted by each entrepreneur which gives rise to a moral hazard problem. We begin our analysis with the capital market. Under the assumption that borrowers are protected by limited liability, the financial contract specifies that the two parties receive nothing when the project fails.[9] Let V_c^j denote the payment to the lender when the project succeeds which implies that the entrepreneur (borrower) keeps $P^j Y^j - V_c^j \equiv V_b^{jc}$. Consider an entrepreneur with initial endowment A. The lender's zero-profit condition, under the assumption that the

[7]Given that our main results concern deviations from cases where the two sectors are symmetric it is important to keep the output levels the same. Unity is only imposed for simplicity.
[8] Given that projects yields nothing in the case of failure there is no distinction between debt and equity.
[9] Having the lender making a payment to the borrower would only weaken incentives and given that all agents are risk neutral there is no need for insurance.

borrower has an incentive to exert effort, is given by $\theta P^j V_c^j = (I - A)R$. The last expression can be written as $\theta\left(P^j Y^j - V_b^{jc}\right) = (I - A)R$. The left-hand side is equal to the expected return of the lender and the right-hand side is equal to the opportunity cost of the loan. The entrepreneur will exert effort if the incentive compatibility $\theta V_b^{jc} \geq B^j$ is satisfied. The constraint, which can be written as $V_b^{jc} \geq \frac{B^j}{\theta}$ sets a minimum on the entrepreneur's return which is equal to the measure of agency costs $\frac{B^j}{\theta}$. For a given contract the entrepreneur has a higher incentive to exert effort when the probability of success is higher. In contrast, a higher benefit offers stronger incentives for shirking. The constraint also implies that the maximum amount that the entrepreneur can pledge to the lender is equal to $\left(P^j Y^j - \frac{B^j}{\theta}\right)$. It is exactly the inability of entrepreneurs to pledge a higher amount that limits their ability to raise more external funds. Substituting the incentive compatibility constraint in the lender's zero profit condition we obtain a threshold level of endowments, A_h^j, such that only those agents with endowments higher that this threshold can obtain market finance. The threshold is given by:

$$A_h^j = I - \frac{1}{R}\left[\theta P^j Y^j - B^j\right] \tag{1}$$

Those agents unable to obtain market finance might be able to obtain a loan from a bank. Banks act as monitors. By monitoring the activities of their clients banks can reduce the private benefit to bB^j, where $b < 1$. But monitoring is costly. We assume that it costs c units of capital.[10] Let V_m^j denote the loan repayment when the project succeeds which implies that the entrepreneur keeps $P^j Y^j - V_m^j \equiv V_b^{jm}$. Consider an entrepreneur with initial endowment A. The monitor's zero-profit condition is given by $\theta P^j V_m^j = (I + c - A)R$; which can be written as $\theta\left(P^j Y^j - V_b^{jm}\right) = (I + c - A)R$.[11] Once more, the entrepreneur will exert effort if the incentive compatibility constraint $\theta V_b^{jm} \geq bB^j$ is satisfied, which can be written as $V_b^{jm} \geq \frac{bB^j}{\theta}$. Substituting the new incentive compatibility condition in the monitor's zero profit condition we can derive a new threshold, A_l^j, such that only those agents with endowments above that threshold level can obtain bank loans. The new threshold is given by:

$$A_l^j = I + c - \frac{1}{R}\left[\theta P^j Y^j - bB^j\right] \tag{2}$$

[10] The exact specification of the monitoring technology is not important as long as we can rank sectors according to their dependence on each source of finance.
[11] In equilibrium an agent will be indifferent between buying bonds and depositing her endowments in a bank.

Borrowing from banks is clearly more expensive than issuing bonds given that monitors must be compensated for their services. The coexistence of a capital market with a banking system requires that $A_h^j > A_l^j$. From (1) and (2) we find that this will be the case if the following inequality is satisfied:

$$c < \frac{B^j(1-b)}{R} \tag{3}$$

Finally, we assume that all agents have homothetic preferences allocating half of their income on each good. Then, in a symmetric equilibrium where $B^1 = B^2$ and $Y^1 = Y^2$ it is clear that $P^1 = P^2$ and the masses of agents obtaining finance from each source is the same across types.

From now on we let good 2 be the numeraire, i.e. $P^2 = 1$ and let P denote the relative price of good 1.

3.1. Closed-Economy Equilibrium without Banks

For the moment, suppose that the monitoring technology is not available. Given that agents always have the option to invest their assets in the CRS technology, the equilibrium interest rate must satisfy $R \geq 1 + P$, where the expression on the right is equal to the return of the CRS technology. Then, the number of entrepreneurs investing in the stochastic technology is determined by either the number of eligible entrepreneurs (the '*financing constraint*') or the total assets available for borrowing (the '*wealth constraint*'). We now define the two types of equilibrium that can occur in this model.

Definition 1: *Wealth Constrained Equilibrium (WCE):* $R \geq 1 + P$. *All endowments are invested in the stochastic technology.*

The imperfections in the capital market do not affect the allocation efficiency of the economy as all capital is invested in the more productive stochastic technology.[12]

Definition 2: *Financially Constrained Equilibrium (FCE):* $R = 1 + P$. *Some endowments are invested in the CRS technology.*

Now, financial markets affect allocation efficiency as some assets are invested in the CRS technology.

3.1.1. WCE

[12] However, imperfections in financial markets imply that entrepreneurship is decided by endowments while in the case of perfect capital markets this decision is indeterminate. Nevertheless, in both cases the mass of entrepreneurs is the same.

Financial market clearing requires that the following condition is satisfied:

$$\int_0^{A_h^1} AdA + \int_0^{A_h^2} AdA = \int_{A_h^1}^1 (I - A)dA + \int_{A_h^2}^1 (I - A)dA$$

The left hand side is equal to the supply of capital by all lenders. The right-hand side is equal to the total demand for external finance. We can rewrite the above condition as:

$$1 = [2 - A_h^1 - A_h^2]I \tag{4}$$

Without any loss of generality, we restrict our attention to the market for good 1. Each producer supplies Y^1 units of good 1 with probability θ. Each agent allocates half her income on good 1 hence her demand is equal to her nominal income divided by $2P$. The good 1 market clearing condition is then given by:

$$\int_{A_h^1}^1 \left(\theta Y^1 - \frac{\theta P Y^1 - R(I-A)}{2P}\right) dA = \int_0^{A_h^1} \frac{RA}{2P} dA + \int_0^{A_h^2} \frac{RA}{2P} dA + \int_{A_h^2}^1 \left(\frac{\theta Y^2 - R(I-A)}{2P}\right) dA$$

The term on the left hand side is equal to the net supply (production minus consumption) of good 1 producers. The first two terms on the right-hand side are equal to the demand for good 1 by those agents of each skill-type who become lenders and the last term is equal to the demand for good 1 by the producers of good 2. We can rewrite the above condition as: $R(1 - [2 - A_h^1 - A_h^2]I) = \theta P Y^1[1 - A_h^1] - \theta Y^2[1 - A_h^2]$

which by using (4) can be simplified to:

$$PY^1[1 - A_h^1] = Y^2[1 - A_h^2] \tag{5}$$

The relative price is equal to the ratio of aggregate production in sector 2 divided by aggregate production in sector 1.

Conditions (2), (4) and (5) solve for the two threshold values, the interest rate and the relative price. As long as the solution for the interest rate is greater or equal to $1 + P$ we have a *WCE*. Given that all assets are employed in the more productive technology there is no role for banks.

3.1.2. FCE

Suppose that the above derivation yields a solution for the interest rate that is less than $1 + P$. This cannot be an equilibrium because the CRS technology offers a higher return that an investment in the capital market. In the new equilibrium some assets will be invested in the CRS technology up to the point where the interest rate is equal to $1 + P$ and thus agents are indifferent between the two investment choices. We obtain the two new threshold levels of endowments that separate those agents that can still invest in stochastic technology by setting $R = 1 + P$ in (1). The total investment in the CRS technology Z will be equal to the excess supply in the financial market when $R = 1 + P$ and is given by

$$Z = 1 - [2 - A_h^1 - A_h^2]I \text{ for } R = 1 + P \tag{6}$$

The market clearing condition for good 1 is now given by:

$$\int_{A_h^1}^{1} \left(\theta Y^1 - \frac{\theta P Y^1 - (I-A)(1+P)}{2P}\right) dA + Z =$$
$$\int_0^{A_h^1} \frac{A(1+P)}{2P} dA + \int_0^{A_h^2} \frac{A(1+P)}{2P} dA + \int_{A_h^2}^{1} \left(\frac{\theta Y^2 - (I-A)(1+P)}{2P}\right) dA$$

Now the supply of good 1 is augmented by the quantity produced using the CRS technology, where each unit of physical assets increases the supply of each good by 1 unit. Notice that, given that $R = 1 + P$, the income of lenders and those who invest in the CRS technology is equal to $A(1 + P)$. We can write the above expression as:

$$(1 - P)Z = \theta P Y^1[1 - A_h^1] - \theta Y^2[1 - A_h^2] \tag{7}$$

3.1.3. External Finance Dependence

Following the literature we say that sector 2 is more external finance dependent than sector 1 if the total borrowing of sector 2 is greater than the total borrowing of sector 1. In the absence of banking, the external finance dependence of sector *j* is equal to its total borrowing from the capital market, MF^j. Formally,

$$MF^j = \int_{A_h^j}^{1} [I - A] dA = \left[I - \frac{1 + A_h^j}{2}\right]\left[1 - A_h^j\right] \tag{8}$$

At this point we introduce an asymmetry between the sectors that affects their access to external finance and will later impart a bias towards a particular source of finance.

Proposition 1: *Suppose that initially there is a symmetric equilibrium where* $B^1 = B^2$ *and* $Y^1 = Y^2$ *and thus* $P = 1$ *and consider a small increase in* B^1. *Then, at the new equilibrium we have:*

(a) $P > 1$, *and*

(b) Sector 2 is the more external finance dependent sector.

Proof: See Appendix 1.

The reduced access to external finance in sector 1 reduces output of good 1 and leads to an increase in its relative price and the interest rate. In the new equilibrium the induced price increase has moderated but not reversed the initial impact of the increase in B^1 on output in sector 1. More agents in sector 2 than in sector 1 obtain external finance .

3.2. Closed-Economy FCE Equilibrium with Banks

Suppose that the equilibrium without banks is such that some endowments are invested in the storage technology. Then the introduction of monitoring (banks) can enhance welfare by mobilizing resources from the CRS to the stochastic technologies.[13] Once more, we can either have an equilibrium with or without investment in the CRS technology. We will focus on FCE ($R = 1 + P$), that is where some endowments are invested in the CRS technology.[14] Once more, the total investment in the CRS technology will be equal to the excess supply in the financial market when $R = 1 + P$:

$$Z = 1 - [2 - A_l^1 - A_l^2]I - c[(A_h^1 - A_l^1) + (A_h^2 - A_l^2)] \tag{9}$$

Now, the demand for funds comes from entrepreneurs who borrow either from the capital market $A_h^j < A < 1$ or banks $A_l^j < A < A_h^j$, $j = 1{,}2$. For the latter group we also have added on the demand side the resources spent on monitoring.

The new goods market clearing condition is given by:

$$\int_{A_h^1}^1 \left(\theta Y^1 - \frac{\theta P Y^1 - (I-A)(1+P)}{2P}\right) dA + \int_{A_l^1}^{A_h^1} \left(\theta Y^1 - \frac{\theta P Y^1 - (I+c-A)(1+P)}{2P}\right) dA + Z = \int_0^{A_l^1} \frac{A(1+P)}{2P} dA + \int_0^{A_l^2} \frac{A(1+P)}{2P} dA + \int_{A_h^2}^1 \left(\frac{\theta\, Y^2 - (I-A)(1+P)}{2P}\right) dA + \int_{A_l^2}^{A_h^2} \left(\frac{\theta Y^2 - (I+c-A)(1+P)}{2P}\right) dA$$

The two terms on the left hand side are equal to the net supply (production minus consumption) of good 1 by those entrepreneurs who borrow from the capital market and by those who borrow from banks, respectively, and the last term is equal to the quantity of good 1 produced using the CRS technology. The first two terms on the right-hand side are equal to the demand for good 1 by those agents of each skill-type who are either lenders or monitors

[13] The argument does not depend on the number of sectors in the economy and thus without any loss of generality suppose that there is a single good in the economy. Begin by considering the case where the equilibrium interest rate under banking is equal to the return of the CRS technology. Given that the return of the stochastic technology dominates the return of the CRS technology all those agents that borrow from banks are strictly better off under the banking equilibrium. Moreover, the equality of the equilibrium interest rates under banking and in the absence of banks implies that the welfare of all other agents remains the same. Next, consider the case when the equilibrium interest rate under banking is higher than the return of the CRS technology. The only complication now is that the increase in the interest rate implies that those agents that borrow from the capital market are worse off while all lenders are better off. However, these are only distributional effects.

[14] It is the more plausible case as there is always some investment in low risk assets.

and the last two terms are equal to the demand for good 1 by the producers of good 2. Using (9) we can rewrite the above condition as:

$$(1-P)Z = \theta P Y^1[1-A_l^1] - \theta Y^2[1-A_l^2] \tag{10}$$

3.2.1. Bank Finance Dependence

Condition (8) defines sector j's requirements for market finance. Its requirements for bank finance (BF^j) and external (total) finance (EF^j), are given by:

$$BF^j = \int_{A_l^j}^{A_h^j}[I-A]dA + \int_{A_l^j}^{A_h^j} c dA = \left[I - \frac{A_h^j + A_l^j}{2}\right]\left[A_h^j - A_l^j\right] + c\left[A_h^j - A_l^j\right] \tag{11}$$

$$EF^j = \int_{A_l^j}^{1}[I-A]dA + \int_{A_l^j}^{A_h^j} c dA = \left[I - \frac{1 + A_l^j}{2}\right]\left[1 - A_l^j\right] + c\left[A_h^j - A_l^j\right] \tag{12}$$

With both financing options available, we say that sector j is more external finance dependent than sector i if $EF^j > EF^i$, and we define a sector j's 'bank dependence' (BD^j) as the ratio of its total borrowing from banks to its total external finance – i.e.

$$BD^j = \frac{BF^j}{EF^j} = \frac{\left[I - \frac{A_h^j + A_l^j}{2}\right]\left[A_h^j - A_l^j\right] + c\left[A_h^j - A_l^j\right]}{\left[I - \frac{1 + A_l^j}{2}\right]\left[1 - A_l^j\right] + c\left[A_h^j - A_l^j\right]} \tag{13}$$

At this point we introduce an assumption that is sufficient for us to identify relative bank dependence:

Assumption 1. $\theta Y > [1+b]\frac{B^1+B^1}{2}$

Our model requires $\theta Y^j > B^j (> bB^j)$ for the advanced technology to be employed using market (bank) finance. This assumption strengthens this requirement.

Proposition 2: *Consider the equilibrium when $Y^1 = Y^2 = Y$ and $B^1 > B^2$. Then we can show that:*

- *(a) $P > 1$, and*
- *(b) $Assumption$ 1 is sufficient for Sector 1 to be the more bank finance dependent sector.*

Proof: See Appendix 1.

At the initial relative price, the increase in B^1 reduces good 1 output, thereby creating an excess demand which increases this good's relative price. The increase in P has both price and interest rate effects in sector 1, which tend to reduce both thresholds in this sector as the price effects dominate; and interest rate effects in sector 2 which tend to increase both its thresholds. Nevertheless, the induced relative price increase cannot be so large as to completely reverse the relative output changes, implying that in the new equilibrium $A_l^1 > A_l^2$. This, with $B^1 > B^2$ in turn implies $A_h^1 > A_h^2$, and $A_h^1 - A_l^1 > A_h^2 - A_l^2$. A larger number of market financed projects and larger average market borrowing per project means that sector 2 has greater access to market finance - $MF^2 > MF^1$. Sector 1 has the larger number of bank financed projects, but because both thresholds are higher in this sector, average bank borrowing per project is lower. Assumption 1 is sufficient to ensure that $BF^1 > BF^2$, however, in which case sector 1 is the relatively bank finance dependent sector. In general we would expect sector 2, with its lower external finance threshold to be the more external finance dependent sector. The only influence working counter to this conclusion is the larger number of bank financed projects in sector 1 and their demand for additional capital (of c per project).

3.3. The Open Economy

Suppose that the world comprises two countries (Home and Foreign) that are initially identical in every respect. Agents can only borrow from domestic financial markets. It is clear that in this case the relative price will be the same in the two countries and there will be no international trade in goods. In what follows, we consider a change in one of the two countries and use the resulting trading equilibrium to identify the pattern of international trade and how these changes affect the development of financial markets. The first change will be an increase in the productivity of one of the two sectors. In this case, comparative advantage will be driven by differences in technologies. The second change will be a decrease in the efficiency of the banking system captured by an increase in *b* in one country. Now financial institutions will provide the driving force behind comparative advantage.

3.3.1. Technological Comparative Advantage

Without any loss of generality, we consider an increase in Y^2 in Home. Then:

Proposition 3: *(Technological Comparative Advantage) Suppose that initially* $Y^1 = Y^2$ *and* $B^1 > B^2$. *Consider an increase in* Y^2 *at Home. In the trading equilibrium*

- *(a) The home country produces relatively more of and therefore exports good 2;*
- *(b) Sector 2 is the less bank dependent sector in the home country; and*
- *(c) Aggregate bank dependency is lower in the home country.*

Proof: See Appendix 1.

At the common free trade relative price (and hence common interest rate), the higher production efficiency of sector 2 in the Home country means that the external finance threshold is lower, and more capital is used under the stochastic technology. This yields an output gain to this sector in addition to the direct production efficiency gain. Home output of good 2 is higher and Home output of good 1 is the same as in the Foreign country, reflecting the Home country (Ricardian) comparative advantage in sector 2. The higher production efficiency in sector 2 also implies a lower market finance threshold and hence more market financed projects and a higher average borrowing per project. In fact both thresholds are lower by the same amount, implying that the numbers of bank financed projects in sector 2 are unchanged. But because the Home bank-financed entrepreneurs have lower average asset holdings, they borrow more per project so that bank financing in sector 2 also increases. The increased market finance dominates, however, and the bank dependency of sector 2 is lower. Sector 1 remains relatively bank finance dependent at Home. With bank dependency the same in sector 1 in both countries, and bank dependency in sector 2 lower at Home, the Home country shows a lower aggregate bank dependency.

In summary, if a country has a Ricardian comparative advantage in the non-bank-finance dependent sector it will export the non-bank-finance dependent good and its economy will exhibit a relatively lower dependence on bank finance.

3.3.2. Institutional Comparative Advantage

We now consider how country differences in the efficiency of bank financial systems affect comparative advantage. Without any loss of generality, consider a higher *b* implying a lower banking efficiency in the Home country. Then:

Proposition 4: *(Institutional Comparative Advantage) Suppose that initially both countries are identical with $Y^1 = Y^2$ and $B^1 > B^2$ Consider an increase in b at Home. Then in the trading equilibrium*

- *(a) Home produces relatively more of and therefore exports good 2;*
- *(b) Home has the lower bank dependency in each sector, so aggregate bank dependency is lower; and*
- *(c) Sector 1 is relatively bank finance dependent at Home.*

Proof: See Appendix 1.

At the common free trade relative price (and hence common interest rate), a less efficient banking system at Home means lower output of both goods, but relatively lower output of good 1 because sector 1 is bank dependent ($B^1 > B^2$). Home exports good 2, the relatively non-bank-finance dependent good. While access to market finance in each sector is the same in the two countries, the Home bank-finance asset threshold is higher in both sectors implying both sectors are less bank finance dependent than their Foreign counterparts. Home therefore shows a lower aggregate bank dependency

In summary, if a country has a relatively less efficient banking sector it will export the less bank dependent good and will exhibit a relatively lower dependence on bank finance.

4. Financial vs Technological Comparative Advantage

Our theoretical model offers two possible explanations for the link between financial market architecture and the patterns of international trade. According to the first explanation export patterns are driven by comparative advantage in financial architecture. The alternative explanation identifies cross-country technological differences as the main source of comparative advantage. Certainly, there is no reason to believe that these two causal interpretations are mutually exclusive. Over time financial development and technological change might co-evolve producing rich dynamical patterns. In this section, we turn our attention once more to the data and look for evidence supporting either/both of the above two theoretical interpretations.

4.1. Financial Markets Drive the Patterns of Trade

Our methodology in this section follows closely Manova (2008). The identification strategy relies on time variation in the patterns of exports due to the liberalization of equity markets. The underlying hypothesis in Manova (2008) is that the development of equity markets following their liberalization would advantage sectors that are more dependent on external finance. However, if, as our model suggest, financial architecture matters then the liberalization of equity markets would have particularly favored those sectors that are more dependent on market finance and less so on bank loans.

We estimate the following model:

$$X_{cit} = \alpha_0 + \beta_0 Lib_{ct} + \beta_1 (BFD_i \times Lib_{ct}) + \beta_2 \left(EFD_i \times Lib_{ct}\right) + GDP_{ct} + \gamma_c + \gamma_i + \gamma_t + \varepsilon_{cit} \quad (14)$$

Our focus is on the interaction term between a sector's bank dependence (BFD_i) and the country's equity market status (Lib_{ct}). We expect a negative coefficient for this interaction term indicating that when countries liberalize their equity market they experience a disproportional boost of their exports from sectors that are relatively less bank dependent.

The dummy variable Lib_{ct} indicates whether the equity market in country c at time t is liberalized and is zero in all years before, and one in all years after the official equity market liberalization date. A similar dummy referring to the "first sign" of an upcoming liberalization is used as an alternative variable for liberalization.[15] These two variables previously used by Manova (2008), have been computed by Bekaert et al (2002, 2005).[16] In our sample, 14 countries liberalized their equity market during the observation period, while 16 countries did so prior to 1980.

As in section 2, X_{cit} is a measure of the log of export for country c in industry i but now also for each year t in the period 1980-2004. The two indices are defined as above. We also control for cross-country and across time differences in national incomes (GDP_{ct}). Lastly, we introduce a set of country, sector and year fixed effects. Because of possible serial correlation over time, we cluster the standard errors at the level of the explanatory variable, i.e. sector-country level (see Angrist and Pischke, 2009).

Table 4 shows our results. In the first column, we evaluate the impact of equity liberalization on export patterns using the official date of liberalization. We also interact the liberalization dummy with each sector's bank dependence. We consistently estimate a strongly negative and highly significant coefficient. Conditional on GDP, general time trends, and country and industry invariant characteristics captured by the country and industry fixed effects, we find a disproportionally large effect of equity liberalization on the exports of sectors which rely relatively less on banks compared to equity markets. Using the coefficients β_0 and β_1 estimated in column I, equity liberalization increases the value of trade by 40.4 percent in a sector relying only on market finance (BFD = 0), while it decreases trade by 94.4 percent (0.404-1.348) in a sector relying only on bank finance (BFD = 1). In the second column, we use the alternative dating for equity liberalization captured by the "first sign" dummy. Our results remain robust when using this indicator. This alternative dating method

[15] Manova (2008) also uses two alternative measures of liberalization, namely: i) an index that is zero before, and ranges between zero and one in all years after the official liberalization, where the index value captures the reform intensity, and ii) an analogous index for the "first sign" of liberalization. The information on reform intensity is not available for many countries of our sample which prevents us from using these alternative measures in our study.

[16] For some countries we rely on the dataset provided by Bekaert and Harvey (2004).

alleviates concerns about possible anticipation effects. Finally, in columns III and IV, we introduce the interaction term between external finance dependence (EFD) and the equity liberalization dummy. Like Manova (2008), we obtain a positive and significant coefficient indicating a disproportionally large effect of liberalization on the exports of sectors with higher external finance dependence. Clearly, our results are complementary to those already reported in the literature.

In order to test their robustness, we have re-estimated the results presented in Table 4 using country-industry fixed effects instead of country *and* industry fixed effects. We have also clustered the standard errors at either the country or the industry level. In all these specifications, for which we omit the detailed results, our coefficient of interest (β_1) remains positive and significant at least at the 10 percent level. These robustness checks are presented in Appendix 3.

As we already know, the development of financial markets offers an advantage to those sectors that are financially dependent. Our work suggests that financial market architecture also matters.

Table 4: Financial Market Development and Comparative Advantage

Equity liberalization date	*Official*	*First sign*	*Official*	*First sign*
	I	**II**	**III**	**IV**
Equity Liberalization	0.404***	0.374***	0.321***	0.216
	(0.083)	(0.096)	(0.117)	(0.132)
Equity Liberalization	-1.348***	-1.174***	-1.256***	-1.001**
* Bank Finance Dependence (BFD)	(0.315)	(0.368)	(0.338)	(0.393)
Equity Liberalization			0.263	0.494**
* External Finance Dependence (EFD)			(0.220)	(0.251)
ln GDP	0.300	0.323*	0.302	0.327*
	(0.194)	(0.195)	(0.193)	(0.193)
Observations	18,078	18,078	18,078	18,078
R-squared	0.803	0.803	0.803	0.803

The dependent variable is the log of exports to the rest of the world by each 3-digit ISIC sector for the years 1979-2004. The Bank Finance Dependence variable is defined in section 2.1. All regressions include a constant term, year and exporter and sector fixed effects, and cluster errors at the exporter-industry level. Standard-errors reported in parentheses. ***, **, *, indicate significance at the 1%, 5%, and 10% level.

4.2. Technology Drives the Patterns of Trade

In this section we assess whether a country's financial market architecture is driven by the requirements of exporting sectors. Our estimation strategy follows Do and Levchenko (2007).

First, we construct a variable summarizing a country's need for bank finance depending on its exports from each sector. Second, we generate an instrument for this variable by estimating the effect of geography variables on trade volumes across sectors. We then evaluate how cross-country differences in bank finance requirements impact a country's financial market architecture.

We combine our industry-level measure of bank dependence (BFD) with data on the structure of a country's exports to develop a measure of a country's requirement of bank loans to finance exports (hereafter BFNX). In particular, we construct the following variable for each country.

$$BFNX_c = \sum_{i=1}^{I} \omega_{ic} BFD_i \quad \text{with } \omega_{ic} = \frac{X_{ic}}{\sum_{i=1}^{I} X_{ic}} \tag{15}$$

where ω_{ic} is the year 2000 share of sector i's exports X_{ic} in total exports of country c for the year and BFD_i is our measure of sector i's bank dependence defined above. In order to assess the robustness of our results we also construct in a similar way a variable that measures the external finance requirements for financing exports ($EFNX_c$), by replacing BFD_i by EFD_i in (15).

Table F of Appendix 4 presents the results from the cross-sectional OLS regression between countries' bank development and their requirements for bank finance, without relying on the IV strategy. The level of bank development of a country ($BANDEV_c$) appears to be positively and significantly correlated with its export dependence on bank finance (BFNX). This is the case for both of our definitions of bank development. It is also robust to the introduction of the EFNX variable.

Of course, such a correlation would not imply causation. In order to assess the causal link between the sectoral composition of exports of a country and their impact on the development of the country's banking sector, we rely on an IV strategy. In order to deal with this endogeneity issue, we follow closely the instrumentation strategy developed by Do and Levchenko (2007). We build our instrument in a similar way as $BFNX_c$ but where ω_{ic} is obtained from the predicted export values obtained from a gravity equation using bilateral trades on a cross section of 170 countries that we run for each of the 28 sectors independently. The data and the gravity equation estimated are identical to those used by Do and Levchenko (2007). The identification is made possible as the sectoral coefficients associate with standard gravity variables, such as distance or common border, are different for each sector. As a result, countries which are far away from their trading partners will have lower predicted export shares in sectors for which the coefficient on distance is higher. From these variations, we obtain predicted values for X_{ic} that vary across countries and also across sectors. We can then use these values to construct a 'Predicted BNX' variable.[17] We then use this new variable to estimate the following system of equations:

$$\textbf{First Stage}: \quad BFNX_c = \alpha_0 + b_1 Predicted\ BFNX_c + \delta Z_c + \epsilon_c$$

$$\textbf{Second Stage}: \quad BANDEV_c = \alpha_0 + \beta_1 \widehat{BFNX}_c + \gamma Z_c + \varepsilon_c$$

In the first stage, the left-hand side variable is a country's export dependence on bank finance, while the right-hand side includes the `predicted' export dependence on bank finance, as well as some other control variables Z. In the second stage, the left-hand side variable is the measure of a country's bank development defined in section 2.2. We expect the requirement of bank finance for exports to impact positively the level of bank development of a country, $\beta_1 > 0$.

In Table 5, we estimate a two-stage least squares (2SLS) regression where we instrument BFNX using its predicted value obtained from the sectoral gravity equations. The top panel contains the full results of the second stage of the regression, while the bottom panel reports only the coefficient on the predicted BFNX from the first stage. For ease of exposition, for the first stage, we only report the coefficient and the standard errors associated with our instrument. The level of bank development of a country ($BANDEV_c$) appears to be positively and significantly affected by the export dependence on bank finance (BFNX). This is the case for both of our definitions of bank development (see columns I and II). It is also robust to the introduction of the EFNX variable (see columns III and IV). The estimates are significant at 5% in columns I and II, at 1% in columns III and IV. The 2SLS coefficients obtained for BFNX are about twice as large as the corresponding OLS coefficients. The coefficient obtained in column III ($\beta_1 = 3.628$), implies that going from the first to the third quartile in term of export need for bank finance (respectively 0.152 and 0.202) is associated with an increase of the bank development of a country from 0.55 to 0.75. This is similar to going from the financial architecture observed in France to that observed in Japan (see Column 1 of Table 2).

[17] A potential issue when constructing our instrumental variable is the large number of industry-country-pairs with zero trade observations. Following Do and Levchenko (2007) our instrument can be constructed either by predicting trade value even for observations that are zero, or by dropping those observations. Table 5 reports results using the first methodology. Very similar results can be obtained when dropping the zeros, where the variables of interest remain significant at least at the 10 percent level both in the first and in the second stage.

Looking at the first stage, the Predicted BFNX is significant at 5% in columns I and II, and at the 1% level in columns III and IV. When only one instrument is used, Stock and Yogo (2005) suggest that a reliable instrument would be associated with a F-statistic above 10. The F-statistic associated with the instrument is 4.57 in columns I and II, which is a sign of a weak instrument. Of course, this specification may be flawed by an omitted variable bias. As we introduce the EFNX variable as a control variable, the F-stat increases to 13.75. This suggests that the inference based on this instrument is indeed reliable. The introduction of other control variables may raise other endogeneity concerns. Following Angrist and Pischke (2009, pp. 217-18), the F-stats that we report in Table 5 are the Angrist-Pischke F-stat, and so, do not suffer from such problems.

A limitation of our estimation is the limited number of observations used for our estimation. Panel estimation may have been preferable but the limited number of years for which the variable BankDev is available makes this approach infeasible.

Table 5: Export Bank Dependence and Financial Architecture: Instruments

Bank Development measure	*BankDev1*	*BankDev2*	*BankDev1*	*BankDev2*
	I	**II**	**III**	**IV**
	Panel A: Second Stage			
External Bank Finance need for export	3.901**	4.070**	3.628***	3.639***
(BFNX)	(1.983)	(1.774)	(1.321)	(1.267)
External Finance need for export			0.089	0.141
(EFNX)			(0.439)	(0.370)
	Panel B: First Stage			
Predicted BFNX	1.429**	1.429**	2.725***	2.725***
	(0.669)	(0.669)	(0.735)	(0.735)
# Observations	30	30	30	30
F-Stat	4.57	4.57	13.75	13.75

In the second stage, the dependent variable is a country's banking sector development for the year 2000 defined in section 22. All regressions include a constant term. Standard-errors reported in parentheses. ***, **, *, indicate significance at the 1%, 5%, and 10% level.

Overall, our results of this section suggest that the evolution of financial market architecture is affected by the financial requirements of sectors with strong exports, a good indicator technological comparative advantage.

5. Concluding Comments

In this paper we have established a link between financial market architecture and export patterns. We started our work by providing some evidence offering support to the Allen and Gale (2001) conjecture about the existence of this link. Then we presented a two-country model where both banks and financial markets co-exist that offered two possible causal explanations for the conjecture. According to one explanation financial market development is the driver of the relationship. In countries with highly efficient banking systems the sectors that are more likely to have a comparative advantage are those sectors that rely more on bank finance. The alternative explanation identifies technology as the variable driving the relationship. Countries with a comparative advantage in sectors that rely on banks for their financial needs are more likely to develop their banking sectors.

By employing methods already applied in the fast growing literature that explores the relationship between financial markets and trade we have provided evidence supporting both theoretical mechanisms. On the one hand, the evidence suggests that the evolution of financial market architecture exerts a bias on export patterns. In particular, changes that favor the equity market relative to the banking sector will have a positive impact on those sectors of the economy that are relatively more dependent on direct finance. On the other hand, our empirical work also suggests that sectors that have a technological advantage also have a significant impact on the evolution of financial market architecture.

References

F. Allen, D. Gale, 1999, Diversity of opinion and the financing of new technologies, *Journal of Financial Intermediation* 8, 68–89

F. Allen, D. Gale, 2001, **Comparing Financial Systems**, MIT Press, Cambridge, MA

J. Angrist, S. Pischke, 2009, **Mostly Harmless Econometrics: An Empiricist's Companion**, Princeton University Press, Princeton, NJ

P. Antras, R. Caballero, 2009, Trade and capital flows: a financial frictions perspective, *Journal of Political Economy* 117, 701-744

T. Beck, 2002, Financial development and international trade: Is there a link? *Journal of International Economics* 57, 107-131

T. Beck, 2003, Financial dependence and international trade, *Review of International Economics* 11, 296-316

T. Beck, A. Demirguc-Kunt, A., and R. Levine, 2009, **A New Database on Financial Development and Structure**, World Bank, Washington, DC

G. Bekaert, C. Harvey, 2004, Country risk analysis: a chronology of important financial, economic and political events in emerging markets, http://people.duke.edu/~charvey/Country_risk/chronology/chronology_index.htm

G. Bekaert, C. Harvey, R. Lumsdaine, 2002, Dating the integration of world equity markets, *Journal of Financial Economics* 2, 203-248

G. Bekaert, C. Harvey, C. Lundblad, 2005, Does financial liberalization spur economic Growth, *Journal of Financial Economics* 77, 3-55

D. Besanko, G. Kanatas, 1993, Credit market equilibrium with bank monitoring and moral Hazard, *Review of Financial Studies* 6, 213–232

S. Bhattacharaya, G. Chiesa, 1995, Financial intermediation with proprietary information, *Journal of Financial Intermediation* 4, 328–357

S. Black and M. Moersch, 1998, Financial structure, investment and economic growth in OECD countries, in S. Black, M. Moersch (eds.), **Competition and Convergence in Financial Markets: The German and Anglo-American Models**, North-Holland, New York, NY, 157–174

P. Bolton, X. Freixas, 2000, Equity, bonds, and bank debt: capital structure and financial market equilibrium under asymmetric information, *Journal of Political Economy* 108, 324-351

A. Boot, A. Thakor, 1997, Financial system architecture, *Review of Financial Studies* 10, 693–733

J. Boyd, B. Smith, 1998, The evolution of debt and equity markets in economic development, *Economic Theory* 12, 519–560

T. Chaney, 2013, Liquidity constrained exporters, NBER Working Paper No.19170

T. Chemmanur, P. Fulghieri, 1994, Reputation, renegotiation, and the choice between bank loans and publicly traded debt, *Review of Financial Studies* 7, 475–506

A. Demirguc-Kunt, R. Levine, 2001, Bank-based and market-based financial systems: crosscountry comparisons, in A. Demirguc-Kunt, R. Levine (eds.), **Financial Structure and Economic Growth: A Cross-Country Comparison of Banks, Markets, and Developmen**t, MIT Press, Cambridge, MA, 81-140

M. Dewatripont, E. Maskin, 1995, Credit and efficiency in centralized versus decentralized markets, *Review of Economic Studies* 62, 541–555

D. Diamond, 1991, Monitoring and reputation: the choice between bank loans and directly placed debt, *Journal of Political Economy* 99, 689-721

Q.-T. Do, A. Levchenko, 2007, Comparative advantage, demand for external finance, and financial development, *Journal of Financial Economics* 86, 796-834

B. Holmström, J. Tirole, 1997, Financial intermediation, loanable funds, and the real sector, *Quarterly Journal of Economics* 112, 663–691

J. Ju and S.-J. Wei, 2011, When is quality of financial system a source of comparative advantage, *Journal of International Economics* 84, 178-187

K. Kletzer and P. Bardhan, 1987, Credit markets and patterns of international trade, *Journal of Development Economics* 27, 57-70

R. Laporta, F. Lopez-de-Silanes, A. Shleifer, R. Vishny, 2000, Investor protection and corporate governance. *Journal of Financial Economics* 58, 3–27

R. Levine, 2002, Bank-based or market-based financial systems: which Is better? *Journal of Financial Intermediation* 11, 398-428

K. Manova, 2008, Credit constraints, equity market liberalizations and international trade, *Journal of International Economics* 76, 33-47

K. Manova, 2013, Credit constraints, heterogeneous firms, and international trade, *Review of Economic Studies* 80, 711-744

K. Matsuyama, 2005, Credit market imperfections and patterns of international trade and capital flows, *Journal of the European Economic Association* 3, 714-723

A. Nicita, M. Olarreaga, 2007, Trade, production, and protection database, *World Bank Economic Review* 21, 165-171.

R. Rajan, L. Zingales, 1998, Financial dependence and growth, *American Economic Review* 88 , 559–586

R. Repullo, J. Suarez, 2000, Entrepreneurial moral hazard and bank monitoring: a model of the credit channel, *European Economic Review* 44, 1931-1950

H. Svaleryd and J. Vlachos, 2005, Financial markets, the pattern of industrial specialization and comparative advantage: Evidence from OECD countries, *European Economic Review* 49, 113-144

J. Stock, M. Yogo, 2005, Testing for weak instruments in linear IV regression, in D. Andrews (ed.) **Identification and Inference for Econometric Models**, Cambridge University Press, New York, NY, 80-108

S. Tadesse, 2002, Financial architecture and economic performance: international evidence, *Journal of Financial Intermediation* 11, 429-454

E. Von Thadden, 1995, Long-term contracts, short-term investment and monitoring, *Review of Economic Studies* 62, 557–575

J. Wynne, 2005, Wealth as a determinant of comparative advantage, *American Economic Review* 95, 226-254

Table 1: Bank Finance Dependence (BFD) and External Finance Dependence (EFD) by sector

Industry Name (Industry code)	Bank Finance Dependence (BFD)	External Finance Dependence (EFD)
Food products (311)	0.201	0.137
Beverages (313)	0.222	0.077
Tobacco (314)	0.000	-0.451
Textiles (321)	0.430	0.400
Wearing apparel, except footwear (322)	1.000	0.029
Leather (323)	0.835	-0.140
Footwear (324)	0.213	-0.078
Wood products, except furniture (331)	0.106	0.284
Furniture, except metal (332)	0.224	0.236
Paper and products (341)	0.016	0.176
Printing and publishing (342)	0.058	0.204
Industrial chemicals (351)	0.044	0.253
Other chemicals (352)	0.266	0.219
Petroleum Refineries (353)	0.061	0.042
Misc. petroleum and coal products (354)	0.061	0.334
Rubber products (355)	0.240	0.226
Plastic products (356)	0.139	1.140
Pottery, china, earthenware (361)	0.347	-0.146
Glass and products (362)	0.075	0.528
Other non-metallic products (369)	0.107	0.062
Iron and steel (371)	0.082	0.087
Non-ferrous metals (372)	0.091	0.005
Fabricated metal products (381)	0.252	0.237
Machinery, except electrical (382)	0.098	0.445
Machinery, electric (383)	0.011	0.767
Transport equipment (384)	0.358	0.307
Prof and scientific equipment (385)	0.000	0.961
Other manufactured products (390)	0.408	0.470

Appendix 1

Proof of Proposition 1

(a) Totally differentiating (7) we obtain:

$$\Big\{-Z + (1-P)\left[\frac{1}{(1+P)^2}(\theta PY - B^1) - \frac{\theta Y}{1+P} + \frac{1}{(1+P)^2}(\theta Y - B^2)\right] - \ \theta Y(1 - A_h^1) + \theta PY\frac{1}{(1+P)^2}(\theta PY - B^1) - \frac{(\theta Y)^2 P}{1+P} - \theta Y\frac{1}{(1+P)^2}(\theta Y - B^2)\Big\}dP = -\left\{\frac{(1-P)I}{1+P} + \frac{\theta PY}{1+P}\right\}dB^1$$

Evaluating this expression at the initial symmetric equilibrium, thus setting $P = 1$ and $B^1 = B^2$, we find that $\frac{dP}{dB^1} > 0$.

(b) The induced increase in P raises the interest rate ($R = 1 + P$) which in turn increases thresholds in both sectors. In sector 1, the direct price effect dominates the (indirect) interest rate effect, as shown by $\frac{\partial A_h^1}{\partial P} = -\frac{\theta Y + B^1}{[R]^2} < 0$; $\frac{\partial A_l^1}{\partial P} = -\frac{\theta Y + bB^1}{[R]^2} < 0$, and the price increase moderates but does not reverse the effects of the increase in B^1 in reducing the output sector 1. This implies that in the new equilibrium $A_h^1 > A_h^2$. A larger number of market financed projects and larger average market borrowing per project means that sector 2 has greater access to external finance - $EF^2 > EF^1$.

Proof of Proposition 2

(a) $P > 1$. At the initial relative price, an increase in B^1 increases the external finance threshold (A_l^1) in sector 1. This leads to a reduction in good 1 output and an excess demand for good 1 which increases its relative price. Totally differentiating (10) we obtain:

$$\Big\{-Z + (1-P)\left[\frac{1}{(1+P)^2}(\theta PY - B^1) - \frac{\theta Y}{1+P} + \frac{1}{(1+P)^2}(\theta Y - B^2) - \frac{2\gamma}{(1+P)^2}\right] - \theta Y(1 - A_l^1) + \theta PY\frac{1}{(1+P)^2}(\theta PY - bB^1) - \frac{(\theta Y)^2 P}{1+P} - \theta Y\frac{1}{(1+P)^2}(\theta Y - bB^2)\Big\}dP = -\left\{\frac{(1-P)}{1+P}(I - (1-b)c) + \frac{\theta PY}{1+P}b\right\}dB^1$$

Evaluating this expression at the initial symmetric equilibrium (where $P = 1$ and $B^1 = B^2$), we find that $\frac{dP}{dB^1} = \frac{\frac{\theta PY}{1+P}b}{Z + \theta Y(1 - A_l^1) + \frac{(\theta Y)^2 P}{1+P}} > 0$.

(b). *Assumption 1 is sufficient for Sector 1 to be the more bank finance dependent sector.* As in proposition 2(b), the induced increase in P raises the interest rate ($R = 1 + P$) which in turn increases thresholds in both sectors. In sector 1, the direct price effect, which tends to reduce both thresholds, dominates the (indirect) interest rate effect, and the price increase moderates but does not reverse the effects of the increase in B^1 in reducing the output sector 1. This implies that in the new equilibrium $A_l^1 > A_l^2$ which from (2) requires $\theta PY - bB^1 < \theta Y - bB^2$. In turn this implies $\theta PY - B^1 < \theta Y - B^2$ and hence, from (1), that $A_h^1 > A_h^2$. A larger number of market financed projects and larger average market borrowing per project means that sector 2 has greater access to market finance - $MF^2 > MF^1$.

Since $BD^j = \frac{BF^j}{EF^j} = \frac{BF^j}{BF^j + MF^j}$, we know $BD^1 > BD^2$ iff $\frac{BF^1}{MF^1} > \frac{BF^2}{MF^2}$ or $\frac{BF^1}{BF^2} > \frac{MF^1}{MF^2}$. We have just shown that $MF^2 > MF^1$, so $BF^1 > BF^2$ is sufficient for sector 1 to be the bank dependent sector. Consider

$$BF^1 - BF^2 = \left\{I + c - \frac{A_h^1 + A_l^1}{2}\right\}\{A_h^1 - A_l^1\} - \left\{I + c - \frac{A_h^2 + A_l^2}{2}\right\}\{A_h^2 - A_l^2\}$$

Using $A_h^j - A_l^j = \frac{B^j}{R}[1-b]$, we see that $A_h^1 - A_l^1 > A_h^2 - A_l^2$, so sector 1 has the larger number of bank financed projects. But both thresholds are higher in sector 1, implying lower average borrowing per bank-financed project. After substituting from (1) and (2) we obtain

$$BF^1 - BF^2 = \left\{\frac{B^1}{R}[1-b] - c\right\}\left\{\frac{c}{2} + \frac{1}{2R}[(\theta PY - B^1) + (\theta PY - bB^1)]\right\}$$

$$-\left\{\frac{B^2}{R}[1-b] - c\right\}\left\{\frac{c}{2} + \frac{1}{2R}[(\theta Y - B^2) + (\theta Y - bB^2)]\right\}$$

Inspection of this expression shows that a sufficient condition for $BF^1 > BF^2$ is that

$$B^1[(\theta PY - B^1) + (\theta PY - bB^1)] > B^2[(\theta Y - B^2) + (\theta Y - bB^2)]$$

If this expression is satisfied at $P = 1$, then it is satisfied for $P > 1$; so setting $P = 1$ and rearranging we obtain our Assumption 1 $\quad \theta Y > [1+b]\frac{B^1 + B^2}{2}$.

Note: We also show the following:

Relative External Finance Dependence is ambiguous: From (12) we have $EF^j = \left\{I - \frac{1 + A_l^j}{2}\right\}[1 - A_l^j] + c[A_h^j - A_l^j]$. Since $A_l^1 > A_l^2$, the number of externally financed projects is higher in Sector 2. But the number of bank financed projects is higher in sector 1, and since bank financed projects require additional (borrowed) capital of c, it is possible that sector 1 has the greater recourse to external finance. Substituting from (1) and (2) and simplifying, we find that

$$EF^2 - EF^1 = \frac{1}{2}\left\{\left\{\frac{\theta Y - bB^2}{R}\right\}^2 - \left\{\frac{\theta PY - bB^1}{R}\right\}^2\right\} - \frac{c}{R}\{[\theta Y - B^2] - [\theta PY - B^1]\}$$

Since both terms in parentheses are positive the sign is ambiguous, but it is more likely to be positive the smaller is c.

Proof of Proposition 3

(a) *The home country produces relatively more of and therefore exports good 2.* Consider the difference in outputs between the home and foreign countries in the trading equilibrium, where both face the same relative price and interest rate, but $Y^2 > Y^1$ at Home .

$$Q^1 = Z + \theta PY^1[1 - A_l^1] \qquad \text{and} \qquad Q^2 = Z + \theta Y^2[1 - A_l^2]$$

So that in comparing the home with the foreign country we have

$$d[Q^1 - Q^2] = -\theta\left\{[1 - A_l^2] - Y^2\frac{\partial A_l^2}{\partial Y^2}\right\}dY^2 = -\theta\left\{[1 - A_l^2] + Y^2\frac{\theta}{R}\right\}dY^2 < 0$$

If Home has a superior technology in good 2 it produces relatively more of good 2 at any given relative prices and hence exports good 2 in the trading equilibrium.

(b) *Sector 2 is the less bank dependent sector in the Home country*. In the trading equilibrium the sectors in the Home country face the same relative price and interest rate but differ in two respects - $B^1 > B^2$ and $Y^2 > Y^1$. In Proposition 3(b) we established that Assumption 1 was sufficient for sector 1 to be relatively bank finance dependent if $B^1 > B^2$. Thus as long as the improvement in technology in sector 2 does not lead it to become more bank dependent, we expect sector 1 to remain the relatively bank finance dependent sector in the home country.

Given the relative price (hence the same interest rate), the effect of the increase in Y^2 on the thresholds in sector 2 in the Home country are $\frac{\partial A_h^2}{\partial Y^2} = -\frac{\theta}{R} = \frac{\partial A_l^2}{\partial Y^2}$. Both thresholds fall by the same amount. This implies more projects are market financed in sector 2, and because the marginal projects are by less wealthy asset owners, the average amount borrowed also increases. So market finance unambiguously increases. So does bank finance. Although the number of projects subject to bank financing is unchanged, the relatively more wealthy bank borrowers have been able to switch to market finance and have been replaced by poorer borrowers. The net result is the same number of projects but an increase in average borrowing. Total external finance clearly increases. These results are confirmed by

$$\frac{\partial MF^2}{\partial Y^2} = \frac{\theta}{R}\{I - A_h^2\} > 0$$

$$\frac{\partial BF^2}{\partial Y^2} = -\frac{\theta}{R}\{I + c - A_h^2\} + \frac{\theta}{R}\{I + c - A_l^2\} = \frac{\theta}{R}[A_h^2 - A_l^2] > 0$$

$$\frac{\partial EF^2}{\partial Y^2} = \frac{\theta}{R}\{I - A_l^2\} > 0$$

Looking at bank finance dependency in sector 2 we have

$$BD^2 = \frac{BF^2}{EF^2} = \frac{BF^2}{MF^2+BF^2}$$

So $$dBD^2 = \frac{MF^2 dBF^2 - BF^2 dMF^2}{[EF^2]^2} = \frac{\theta}{R}\frac{1}{[EF^2]^2}\{MF^2[A_h^2 - A_l^2] - BF^2[I - A_h^2]\}$$

$$dBD^2 = -\frac{\theta}{R}\frac{[I-A_h^2][A_h^2-A_l^2]}{[EF^2]^2}\left\{\frac{[I-A_l^2]}{2} + c\right\} < 0$$

That is, the bank dependency of sector 2 falls in the Home country as a result of the improvement in its technology.

(c) Aggregate bank dependency is lower in the Home country. The difference between aggregate bank finance dependency in the Home and Foreign countries in the trading equilibrium can be derived in a similar way.

$$BD = \frac{BF}{EF}$$

so $$dBD = \frac{EFdBF - BFdEF}{[EF]^2} = \frac{1}{EF}\{dBF^2 - BDdEF^2\}$$

Substituting from above

$$dBD = \frac{1}{EF}\frac{\theta}{R}\{[A_h^2 - A_l^2] - BD[I - A_h^2]\} = \frac{\theta[I-A_h^2]}{R.EF.}\left\{\frac{[A_h^2-A_l^2]}{[I-A_h^2]} - BD\right\}$$

Now $$\frac{[A_h^2-A_l^2]}{[I-A_h^2]} < \frac{[A_h^2-A_l^2]}{[1-A_h^2]} = \frac{BF^2}{\overline{BF}^2}\Big/\frac{EF^2}{\overline{EF}^2} = \frac{BF^2}{EF^2}\frac{\overline{EF}^2}{\overline{BF}^2} < \frac{BF^2}{EF^2} = BD^2 < BD$$

Where we have used $I > 1$ and that average bank borrowing ($\overline{BF}^2$) is higher than average borrowing ($\overline{EF}^2$) since the agents with the least wealth are those that resort to bank finance.

So $dBD < 0$. Thus the aggregate bank dependency will be lower in the country with the comparative advantage in the non-bank dependent sector.

Proof of Proposition 4

Suppose the two countries are identical except that the home country has a less efficient banking sector.

(a) *The home country produces relatively more of and therefore exports good 2.* Consider the difference in outputs between the home and foreign countries in the trading equilibrium.

$$Q^1 = Z + \theta P Y^1[1 - A_l^1] \qquad \text{and} \qquad Q^2 = Z + \theta Y^2[1 - A_l^2]$$

Then $\quad d[Q^1 - Q^2] = \left\{-\theta P Y \frac{\partial A_l^1}{\partial b} + \theta Y \frac{\partial A_l^2}{\partial b}\right\} db = -\frac{\theta Y}{R}\{PB^1 - B^2\}db$

Implying $\quad \frac{\partial[Q^1 - Q^2]}{\partial b} < 0$, since $B^1 > B^2$ and $P > 1$. So Home output of the relatively bank dependent sector is lower implying the Home imports this good.

(b) *The Home country has the lower bank dependency in each sector, so aggregate bank dependency is lower at Home.* With regard to the sources of finance, MF^j is unaffected by the change in b, but

$$\frac{\partial EF^j}{\partial b} = \frac{\partial BF^j}{\partial b} = -\left\{I + c - A_l^j\right\}\frac{\partial A_l^j}{\partial b} = -\left\{I + c - A_l^j\right\}\frac{B^j}{R} < 0$$

The demand for bank finance and external finance both fall in each sector. Also

$$dBD^j = \frac{MF^j dBF^j}{\left[EF^j\right]^2} = -\frac{MF^j}{[EF^2]^2}\left\{I + c - A_l^j\right\}\frac{B^j}{R} < 0$$

The country with the relatively less efficient banking sector has lower bank dependency in each sector. Given that access to market finance is the same in the two countries and that access to bank finance is lower in both sectors in the Home country, then Home bank dependency is lower in aggregate.

(c) Sector 1 is relatively bank finance dependent in the Home country In the trading equilibrium the two Home sectors face the same relative price, interest rate and parameters except that $B^1 > B^2$. In Proposition 2(b) we established that Assumption 1 was sufficient for sector 1 to be the bank finance dependent sector in these circumstances. So provided Assumption 1 continues to hold at the higher b, and we assume that it does, then sector 1 is relatively bank finance dependent in the Home country.

Appendix 2

Graph 1 presents the different point estimates and the 90% confidence intervals of β_1, i.e. the interaction term "Bank Development * Bank Finance Dependence (BFD)" for several years.

In Table 3 Column III, we estimate the following model for the year 2000:

$$X_{ci} = \alpha_0 + \beta_1(BANDEV_c \times BFD_i) + \beta_2(BANDEV_c \times EFD_i) + \gamma_c + \gamma_i + \varepsilon_{ci}$$

We reproduce the same exercise for each year between 1994 and 2004 (one regression per year), where our dependent variable as well as our measure of banking development are for a given year.

Graph 1: Point estimates and confidence intervals of β_1 for each year.

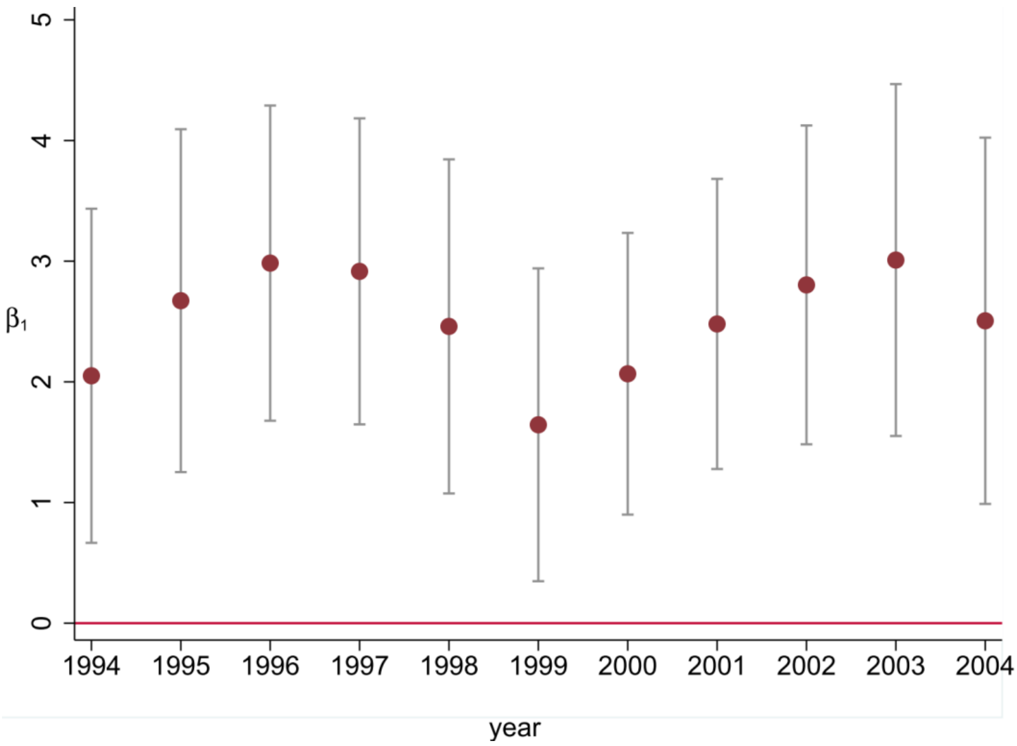

Table A reproduces the results presented in Table 3 in the main text but with clustered standard errors at the exporter level instead of exporter-industry level.

. **Table A: Export Patterns, Financial Architecture and Bank Dependence**

Bank Development measure	*BankDev1*	*BankDev2*	*BankDev1*	*BankDev2*
	I	**II**	**III**	**IV**
Bank Development	2.189**	2.043**	2.067**	1.780*
* Bank Finance Dependence (BFD)	(0.899)	(0.853)	(0.889)	(0.915)
Bank Development			-0.354	-0.766
* External Finance Dependence (EFD)			(0.774)	(0.745)
# Observations	839	839	839	839
R-squared	0.835	0.834	0.835	0.835

The dependent variable is the log of exports to the rest of the world by each 3-digit ISIC sector for the year 2000. The Bank Finance Dependence variable is defined in section 2.1. All regressions include a constant term, year and exporter-sector fixed effects, and cluster errors at the exporter level. Standard-errors reported in parentheses. ***, **, *, indicate significance at the 1%, 5%, and 10% level.

Table B reproduces the results presented in Table 3 in the main text but with clustered standard errors at the industry level instead of exporter-industry level.

. **Table B: Export Patterns, Financial Architecture and Bank Dependence**

Bank Development measure	*BankDev1*	*BankDev2*	*BankDev1*	*BankDev2*
	I	**II**	**III**	**IV**
Bank Development	2.189***	2.043***	2.067***	1.780***
* Bank Finance Dependence (BFD)	(0.663)	(0.557)	(0.687)	(0.537)
Bank Development			-0.354	-0.766
* External Finance Dependence (EFD)			(0.545)	(0.556)
# Observations	839	839	839	839
R-squared	0.835	0.834	0.835	0.835

The dependent variable is the log of exports to the rest of the world by each 3-digit ISIC sector for the year 2000. The Bank Finance Dependence variable is defined in section 2.1. All regressions include a constant term, year and exporter-sector fixed effects, and cluster errors at the industry level. Standard-errors reported in parentheses. ***, **, *, indicate significance at the 1%, 5%, and 10% level.

Appendix 3

Table C reproduces the results presented in Table 4 in the main text but with clustered standard errors at the exporter level instead of exporter-industry level.

Table C: Financial Market Development and Comparative Advantage

Equity liberalization date	*Official*	*First sign*	*Official*	*First sign*
	I	**II**	**III**	**IV**
Equity Liberalization	0.404**	0.374*	0.321	0.216
	(0.166)	(0.206)	(0.201)	(0.235)
Equity Liberalization	-1.348***	-1.174**	-1.256**	-1.001*
* Bank Finance Dependence (BFD)	(0.461)	(0.522)	(0.486)	(0.528)
Equity Liberalization			0.263	0.494
* External Finance Dependence (EFD)			(0.377)	(0.466)
ln GDP	0.300	0.323	0.302	0.327
	(0.207)	(0.204)	(0.207)	(0.204)
Observations	18,078	18,078	18,078	18,078
R-squared	0.803	0.803	0.803	0.803

The dependent variable is the log of exports to the rest of the world by each 3-digit ISIC sector for the years 1979-2004. The Bank Finance Dependence variable is defined in section 2.1. All regressions include a constant term, year and exporter and sector fixed effects, and cluster errors at the exporter level. Standard-errors reported in parentheses. ***, **, *, indicate significance at the 1%, 5%, and 10% level.

Table D reproduces the results presented in Table 4 in the main text but with clustered standard errors at the industry level instead of exporter-industry level.

Table D: Financial Market Development and Comparative Advantage

Equity liberalization date	*Official*	*First sign*	*Official*	*First sign*
	I	**II**	**III**	**IV**
Equity Liberalization	0.404***	0.374***	0.321**	0.216
	(0.074)	(0.083)	(0.150)	(0.149)
Equity Liberalization	-1.348***	-1.174***	-1.256***	-1.001**
* Bank Finance Dependence (BFD)	(0.253)	(0.328)	(0.333)	(0.394)
Equity Liberalization			0.263	0.494
* External Finance Dependence (EFD)			(0.335)	(0.367)
ln GDP	0.300*	0.323*	0.302*	0.327*
	(0.168)	(0.172)	(0.168)	(0.171)
Observations	18,078	18,078	18,078	18,078
R-squared	0.803	0.803	0.803	0.803

The dependent variable is the log of exports to the rest of the world by each 3-digit ISIC sector for the years 1979-2004. The Bank Finance Dependence variable is defined in section 2.1. All regressions include a constant term, year and exporter and sector fixed effects, and cluster errors at the industry level. Standard-errors reported in parentheses. ***, **, *, indicate significance at the 1%, 5%, and 10% level.

Table E reproduces the results presented in Table 4 in the main text but using country-industry fixed effects instead of country *and* industry fixed effects.

Table E: Financial Market Development and Comparative Advantage

Equity liberalization date	*Official*	*First sign*	*Official*	*First sign*
	I	**II**	**III**	**IV**
Equity Liberalization	0.295***	0.294***	0.130	0.109
	(0.067)	(0.075)	(0.095)	(0.103)
Equity Liberalization	-0.812***	-0.760***	-0.631***	-0.558**
* Bank Finance Dependence (BFD)	(0.225)	(0.254)	(0.240)	(0.270)
Equity Liberalization			0.520***	0.577***
* External Finance Dependence (EFD)			(0.177)	(0.192)
ln GDP	0.313*	0.336*	0.317*	0.340*
	(0.187)	(0.189)	(0.186)	(0.187)
Observations	18,078	18,078	18,078	18,078
R-squared	0.953	0.953	0.953	0.953

The dependent variable is the log of exports to the rest of the world by each 3-digit ISIC sector for the years 1979-2004. The Bank Finance Dependence variable is defined in section 2.1. All regressions include a constant term, year and exporter and sector fixed effects, and cluster errors at the exporter-industry level. Standard-errors reported in parentheses. ***, **, *, indicate significance at the 1%, 5%, and 10% level.

Appendix 4

Table F presents the cross-sectional OLS regression between the requirement of bank finance for exports and the level of bank development of a country, without relying on the IV strategy. We estimate the following equation:

$$BANDEV_c = \alpha_0 + \beta_1 BFNX_c + \beta_1 EFNX_c + \gamma Z_c + \varepsilon_c$$

The left-hand side variable is the measure of country's bank development defined in section 2.2. The columns of Table F follow the same sequence as those of Table 5. The level of bank development of a country ($BANDEV_c$) appears to be positively and significantly correlated with its export dependence on bank finance (BFNX). This is the case for both of our definition of bank development (columns I and II). It is also robust to the introduction of the EFNX variable (columns III and IV).

Table F: Export Bank Dependence and Financial Architecture: OLS

Bank Development measure	*BankDev1*	*BankDev2*	*BankDev1*	*BankDev2*
	I	**II**	**III**	**IV**
Bank Finance requirement for export	1.805**	1.971**	1.696**	1.911**
(BFNX)	(0.751)	(0.738)	(0.796)	(0.786)
External Finance requirement for export			-0.176	-0.096
(EFNX)			(0.374)	(0.370)
# Observations	30	30	30	30
R-squared	0.171	0.203	0.178	0.205

The dependent variable is a country's banking sector development for the year 2000 defined in section 2.2. All regressions include a constant term. Standard-errors reported in parentheses. ***, **, *, indicate significance at the 1%, 5%, and 10% level.