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FINANCIAL DEVELOPMENT, OPENNESS AND INSTITUTIONS: EVIDENCE FROM PANEL DATA

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Abstract

Utilising four annual panel datasets and dynamic panel data estimation procedures we find that trade and financial openness, as well as economic institutions are statistically important determinants of the variation in financial development across countries and over time since the 1980s. However, we find mixed support for the hypothesis that the simultaneous opening of both trade and capital accounts is necessary to promote financial development in a contemporary setting.

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1. Introduction

It is now widely accepted that financial development constitutes a potentially important mechanism for long run growth (Levine, 2003; Demetriades and Andrianova 2004; Demetriades and Hussein, 1996; Goodhart, 2004).[1] The frontier of the literature in this field is, therefore, shifting towards providing answers to the question of why some countries are more financially developed than others. Four influential hypotheses have emerged in recent literature, which directly or indirectly are able to provide plausible answers to this question. These are (i) the endowment hypothesis; (ii) the law and finance hypothesis; (iii) the simultaneous openness hypothesis; (iv) the economic institutions hypothesis. Briefly, the essential ingredients of each of the three hypotheses are as follows:[2]

(i) The endowment hypothesis introduced by Acemoglu *et al* (2001) acknowledges the importance of strong institutions for financial development and argues that institutional quality varies across countries because of varying initial endowments. In simple terms, this hypothesis suggests that the disease environment encountered by European colonising powers in past centuries – proxied in empirical studies by settler mortality - was a major retarding factor for the establishment of institutions that would promote long run prosperity. Thus, it is argued that European colonial powers established extractive institutions that are unsuitable for long-term growth where the environment was unfavourable and institutions that were better suited for growth where they encountered favourable environments.

(ii) The law and finance hypothesis due to La Porta *et al* (1997) puts forward the idea that common law based systems, originating from English law, are better suited than civil law based systems, primarily rooted in French law, for the development of capital markets. This is because English law evolved to protect private property from the crown while French law was developed with the aim of addressing corruption of the judiciary and enhancing the powers of the state. Over time this meant that legal systems originating from English law protected small investors a lot better than systems

[1] Other fundamental mechanisms of growth include economic institutions, such as property rights. Claessens and Laeven (2003), for example, provide firm level evidence which suggests that the effect of better property rights on growth is as large as the effect of improved access to financing due to greater financial development. It has also been argued that where property rights are weak, financial development may not be sufficient to promote growth. Weak property rights may discourage investment even when bank loans are available (see Johnson, McMillan and Woodruff, 2002).

[2] These hypotheses may contain some common elements. We introduce them separately to clarify the exposition.

which evolved from French law. Consequently, it is argued that capital markets developed faster in countries with common law systems than in those with civil law systems.[3]

(iii) The openness hypothesis put forward by Rajan and Zingales (2003), postulates that interest groups, specifically industrial and financial incumbents, frequently stand to lose from financial development, because it usually breeds competition, which erodes their rents. They argue that incumbents' opposition will be weaker when an economy is open to both trade and capital flows, hence the opening of *both* the trade and capital accounts holds the key to successful financial development. This is not only because trade and financial openness limit the ability of incumbents to block the development of financial markets but also because the new opportunities created by openness may generate sufficient new profits for them that outweigh the negative effects of increased competition.

(iv) *The economic institutions hypothesis* recently put forward by Acemoglu *et al* (2004), which builds on the endowment hypothesis, proposes a dynamic political economy framework in which economic differences in economic institutions are the fundamental cause of differences in economic development. Economic institutions, which determine the incentives and constraints of economic agents, are social decisions that are chosen for their consequences. Political institutions and income distribution are the dynamic forces that combine to shape economic institutions and outcomes. It is argued that growth promoting economic institutions emerge when political institutions (a) allocate power to groups with interests in broad based property rights enforcement, (b) create effective constraints on power holders and when there are few rents to be captured by power holders.

The first two hypotheses, by emphasising historical factors that are time invariant can, at best, only explain some of the cross-country variation in financial development.[4] The third and fourth hypotheses could go some way in explaining both the cross-country and the time series variation in financial development, since they are both dynamical in nature, in that they emphasize factors that may be changing over time. Even though both these hypotheses acknowledge the importance of political elites, they nevertheless emphasize distinct mechanisms of financial development. The third hypothesis emphasizes the importance of simultaneous current account and capital account

[3] Beck et al (2003a) provide evidence which suggests that both these two hypotheses have some merit in explaining cross-country variations in financial development but find more evidence in favour of the endowments one.

[4] These hypotheses cannot be tested using panel data fixed effects or first differenced models, since the factors that they emphasise are time invariant and are either spanned by the country dummies or are differenced away and cannot be identified.

openness and as such also has clear contemporary policy implications.[5] The fourth hypothesis suggests that even though complex political mechanisms may be at work (including social conflict emanating from changing political forces such as the rise of mass democracy and the changes in the distribution of income), economic institutions are the main mechanism that helps to shape economic development at any point in time.

The importance of understanding the factors behind the time series variation in financial development, alongside those that shape the cross-country variation, cannot be overemphasised. Consider, for example, the case of South Korea, a well known success story in terms of financial and economic development. During 1960-2004, South Korea's ratio of private credit to GDP rose from 12.29 (per cent of GDP) to 98.21 (per cent of GDP), representing an eight-fold increase in one of the most important indicators of financial development in less than half a century.[6] This massive leap forward constitutes a significant closing of the gap between South Korea and the 15 high income OECD countries, whose private credit to GDP ratio climbed from 66 per cent of GDP in 1960 to 185 per cent of GDP in 2004. Thus, South Korea's credit to GDP ratio rose from 18% of the average of the world leaders in 1960 to 53% by 2004.[7] While it may be argued that Korea's spectacular financial development is exceptional, examining the norm suggests that the time series variation in financial development over the same period has been quite substantial: the worldwide average of private credit to GDP increased by 54% during the same period. This figure masks wide regional variation from 435% in South Asia to 165% in North Africa-Middle East and 37% in the Latin American-Caribbean region.

Given the importance of the time-series variation in financial development in modern times, an empirical investigation into its determinants must be able to account for its variation both across countries and over time. We therefore utilise panel data techniques and annual data to shed light on the determinants of financial development in these two dimensions. The specification of our empirical model is informed by the third and fourth hypotheses, both of which acknowledge the role of political economy factors but emphasize different mechanisms of (financial and economic) development.

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[5] Interestingly these implications are not consistent with the sequencing literature, which advocates that trade liberalisation should precede financial liberalisation and that capital account opening should be the last stage in the liberalisation process (e.g. McKinnon, 1991).

[6] All the data quoted in this section are obtained from World Development Indicators 2005.

[7] Neither the legal origin nor the endowment hypothesis, both of which focus on pre-determined historical factors, can explain cases such as South Korea. Interestingly, South Korea's legal tradition is based on civil law traditions, via Japan and Germany.

While it is highly plausible – indeed almost tautological - that political economy factors have a key influence in shaping policies and institutions that affect the development of financial markets, providing empirical evidence that tests the two hypotheses directly is not straightforward. For a start, appropriate political economy measures of the interests and power of elites are not directly observable.[8] Observable political variables, such as political system or political orientation, are too crude to capture the intrigues that help to shape policies and institutions that affect financial development.[9] Thus, the best that can be established empirically is whether the evidence is consistent with the economic implications of the two hypotheses by using the (reduced form) mechanisms suggested by Rajan and Zingales (2003) – trade and financial openness - and Acemoglu *et al* (2004) – economic institutions. To this end, this paper examines the following two hypotheses utilising annual panel data and appropriate estimation methods:

I. Does the simultaneous opening of both trade *and* capital accounts promote financial development?

II. Do economic institutions have a positive influence on financial development over and above trade and financial openness?

The first hypothesis requires both trade and financial openness to be statistically significant determinants of financial development. A stricter interpretation of RZ needs to provide a test of the prediction that the opening of both trade and capital accounts is a necessary condition for successful financial development. Rajan and Zingales (2003) argue that trade openness without financial openness is likely to result in greater financial repression of new firms as well as loan subsidies, so that industrial incumbents have sufficient cheap finance to face competition. They also argue that the financial openness alone will allow the largest domestic firms to tap foreign funds – which they may not actually need – but will not allow small or potential domestic firms access to funds. The domestic financial sector may see its profits threatened since industrial incumbents have access to international finance and may therefore push for liberalising access. However, it will face opposition by industrial incumbents who will continue to oppose financial development in order to prevent competition. Thus, "…cross border capital flows alone are unlikely to convince both our interest groups to push for financial development."(Rajan and Zingales 2003, p.22). Hence, the

[8] Kauffman and Vicente (2005) have recently produced an indicator of 'corporate legal corruption' for 2004, which would have been well suited for our purpose had it been available longitudinally.
[9] Abiad and Mody (2005) find that political factors are not statistically significant determinants of the probability of financial reforms.

strict interpretation of RZ should also provide a test of the following two hypotheses, which can be considered as elaborations of Hypothesis I:

a. Trade openness without financial openness does not promote financial development.

b. Financial openness without trade openness does not promote financial development.

Our empirical strategy aims to provide evidence on both the loose and strict interpretations of RZ. We elaborate on this in Section 2.

Hypothesis II, while not inconsistent with RZ, is much closer to the core of the Acemoglu *et al* (2004) thesis which postulates that economic institutions are the fundamental cause of long run growth.[10] Indeed, Rajan and Zingales recognise the importance of economic institutions, such as respect for property rights, accounting and disclosure standards, contract enforcement and regulation. However, they see these institutions as a mechanism driven by political economy factors, which are ultimately shaped by trade and financial openness. Since trade and financial openness variables are the ultimate determinants of financial development in RZ, including institutions alongside openness in the same equation is like including the same variable twice (i.e. double counting). This may lead to multicollinearity which may take away from the statistical significance of the openness variables. Thus, a pure test of RZ needs to exclude economic institutions from the conditioning set.[11]

The empirical evidence on the two hypotheses of interest remains relatively thin, in spite of several important recent contributions. The sample of countries and the period used by Rajan and Zingales was dictated by their desire to explain reversals in financial development through a historical perspective, covering the period 1913-1999. Notwithstanding the importance and contribution of their empirical exercise, their cross-country snapshots at specific points in time do not utilise the time dimension to explain the variation of financial development over time. Chinn and Ito (2006), on the other hand, do take advantage of some of the time series variation in available data by making use a panel of 108 countries during 1980-2000 and examine questions similar to ours,

[10]Many other authors have emphasised the importance of institutions for economic growth and the development of financial markets (e.g. North and Weingast, 1989; Arestis and Demetriades, 1997; Demetriades and Andrianova, 2004).

[11] Even if economic institutions are found to be important for financial development (and economic growth) it does not necessarily follow that elites have a decisive influence on whether such institutions are adopted. The political economy factors at play may reflect much wider considerations than the interests of industrial and financial incumbents. For example, they may include the ability of the Breton Woods institutions to instigate institutional reform or introduce policy reform. Importantly, they may also reflect the political desire of a country to be admitted in prestigious 'clubs' like the OECD or the European Union, such as Korea in the 1990s.

focussing on the links between capital account liberalization, and equity market development.[12] However, they utilise five year panels by averaging out annual observations over five-year non-overlapping periods. This inevitably results in an 80 per cent reduction in the number of observations that are used for estimation, as well as loss of potentially useful information provided by the time series variation, both of which may impair the identification of the parameters of interest.[13] Moreover, Chinn and Ito employ their own index of capital account liberalization (Chinn and Ito, 2002), defined as the first principal component of four binary measures of capital controls.[14] They interact this index with a measure of legal and institutional development, which further compounds the interpretation problem. Their main finding is that capital account liberalization spurs equity market development only if a threshold level of legal development has been attained. They do not, however, test the simultaneous openness hypothesis, which is one of the two primary objectives of this paper. Moreover, their main focus is equity market development, while we largely focus on banking system development, not least because we aim to provide policy implications for the least financially developed economies. [15] [16]

The paper is organised as follows. Section 2 explains the empirical strategy, which encompasses specifying an appropriate dynamic model and estimation method. Section 3 describes the various data sets that are utilised in the estimations of the model. Section 4 reports and discusses the econometric results and makes comparisons to related literature, where appropriate. Section 5

[12] However, Chinn and Ito's choice of estimator casts doubt on the robustness of their results. Specifically, they use OLS without controlling for country fixed effects. If the omitted country specific effects - such as legal origin, geographical factors, ethno-linguistic fractionalisation - are correlated with the right hand side regressors, which include per capita income, trade openness and the lagged level of financial development, then their estimates would be biased and inconsistent. Thus, their findings should be treated with a fair degree of caution.

[13] Indeed most of the estimated coefficients in their tables are statistically insignificant.

[14] Principal component analysis is a purely statistical transformation of collinear economic variables into a set of uncorrelated variables – the principal components. However, the transformed variables have no meaningful economic interpretation. Moreover, the first principal component accounts for only a fraction of the variation of the underlying economic variables; the variation that is not accounted for may result in omitted variable bias.

[15] At early stages of development, banking system development is perhaps the only feasible type of financial development that can be considered. Chinn and Ito (2006) themselves find that banking system development is a precondition for equity market development.

[16] Other authors have examined related questions but no one has directly examined both hypotheses investigated by this paper. Beck (2003) shows that countries with better-developed financial systems have higher shares of manufactured exports in GDP and in total merchandise exports. Svaleryd and Vlachos (2002) find that there is a positive interdependence between financial development and liberal trade policies. Levine (2001) finds that liberalising restrictions on international portfolio flows tends to enhance stock market liquidity, and allowing greater foreign bank presence tends to enhance the efficiency of the domestic banking system. Klein and Olivei (1999) show that capital account liberalisation has a substantial impact on growth via the deepening of a country's financial system in highly industrialised countries, but find little evidence of financial liberalisation promoting financial development outside the OECD. Huang and Temple (2005) focus on the relationship between financial development and trade openness, but do not take into account capital account openness and institutions. There is also a large micro-literature investigating peripheral questions such as the impact of foreign bank entry on domestic banks (Claessens et al, 2001), the effects of stock market liberalization on equity prices (Henry, 2000), the impact of capital account liberalization on economic growth (Bekaert, Harvey and Lundblad, 2001).

draws out the policy implications of our estimates by calculating and commenting on the marginal effects of openness and institutions. Finally, Section 6 summarises and concludes.

2. Empirical Strategy

A Dynamic Empirical Model

Our empirical specification is aimed at explaining the variation in financial development across countries and over time by utilising an empirical model that allows the testing of the two hypotheses of interest. Given this aim, our empirical strategy endeavours to make maximum use of both the time and cross-country dimensions of available data sets, which dictates using data at an annual frequency in the estimation.[17] Using annual data for estimation purposes necessitates making an allowance for the possibility that the annual observations on financial development may not represent long run equilibrium values in any given year, because of slow adjustment to changes in other variables.[18] To allow for the possibility of partial adjustment, we specify a dynamic log-linear equation for financial development which includes a lagged dependent variable. Our empirical model is therefore as follows:

$$\ln FD_{it} = \beta_0 + \gamma \ln FD_{it-1} + \beta_1 \ln Y_{it-1} + \beta_2 \ln TO_{it-1} + \beta_3 \ln FO_{it-1} + \beta_4 \ln INS_{it-1} + \\ + \beta_5 \{\ln FO_{it-1} \text{ x } \ln TO_{it-1}\} + u_{it} \qquad (1)$$

where *FD* is an indicator of financial development, *Y* is per capita income, *TO* is trade openness, *FO* is financial openness, *INS* is economic institutions and u is an error term that contains country and time specific fixed effects:

$$u_{it} = \mu_i + \varepsilon_t + \nu_{it}$$

[17] Our empirical strategy differs from much of the empirical growth literature, which typically averages out data over five or ten year horizons, which is aimed at capturing the steady state relationship between the variables on hand. However, averaging out need not always capture the steady state equilibrium while the smoothing out of time series data removes useful variation from the data, which may result in imprecise estimates.

[18] Indicators that are asset based such as liquid liabilities, which measures the size of the banking system relative to GDP, are likely to display persistence: the size of the banking system this year has much to do with the size of the banking system in previous years. A similar argument can also be made for flow variables, such as bank credit. Even though it may be expected that the flow of credit can adjust more quickly to its equilibrium value than the stock of assets, the former also depends on its own history. A bank's customer base largely determines the demand for loans in a given year and that is not expected to fluctuate much from year to year. The same is true of bank loan supply, because the latter depends on the bank's scale of operations, proxied by the size of its balance sheet. It is therefore plausible to argue that on a year to year basis, all financial development indicators exhibit persistence, and adjust in accordance to a partial adjustment mechanism.

where the ν_{it} are assumed to be independent and identically distributed with mean zero and variance σ_ν^2.

The right hand side regressors are lagged by one period in order to address possible simultaneity or reverse causality from financial development to any of the right hand side regressors. Importantly, for example, the finance and growth literature suggests that financial development may help to promote economic growth, which could mean that GDP per capita may be a function of either the current or past levels of financial development. Including the lagged value of GDP per capita addresses possible reverse causality, in so far as the ν_{it} are independent of each other and across time.

Hypothesis Testing and Policy Implications

Equation (1) includes the variables of interest for the two hypotheses that are being tested, alongside a lagged dependent variable intended to capture dynamics and the level of per capita income, intended as a control variable. The equation postulates that financial development is determined by the variables of interest – trade and financial openness and economic institutions – alongside a set of conditioning variables, which include: the past history of financial development, summarised by the lagged dependent variable, the stage of economic development, captured by per capita income, and all time-invariant country specific factors, such as geography, climate, ethno-linguistic characteristics etc.

The interaction term between trade and financial openness is expected to shed light on the simultaneous openness hypothesis. At the margin, the total effect of increasing trade and/or financial openness can be calculated by examining the partial derivatives of financial development with respect to each of the openness variables:

$$\frac{\partial \ln FD_{it}}{\partial \ln TO_{it-1}} = \beta_2 + \beta_5 \ln FO_{it-1} \qquad (2)$$

$$\frac{\partial \ln FD_{it}}{\partial \ln FO_{it-1}} = \beta_3 + \beta_5 \ln TO_{it-1} \qquad (3)$$

Hypothesis I is satisfied if the sum of the two derivatives is positive. A small increase in both trade and financial openness would then result in a positive impact on financial development. This is clearly satisfied if both the partial derivatives above are positive, in which case the simultaneous opening of both trade and capital accounts would have a larger impact on financial development than the opening of either.

The strict version of RZ implies that the marginal effect of trade openness should be non-positive when an economy is financially closed. It also implies that the marginal effect of financial openness should be non-positive when an economy is closed to trade. These two predictions provide relatively straightforward tests of the strict version of RZ. We examine these questions by calculating the partial derivatives at the minimum levels of openness within our sample. If it is the case that in the most closed economy-year, the marginal effects of trade and financial openness are positive, we can conclude that an important prediction of RZ does not hold. On the other hand, if we find that the marginal effects at the minimum levels of openness to be non-positive, we conclude that there is some evidence in favour of RZ. This test clearly errs on the side of being too generous to RZ. A less generous definition of 'closed' would be the bottom decile or quartile. A counter-argument of being too generous to RZ is that we now live in an era of relative trade and financial openness, in which case even the minimum values of openness we observe in our sample, which is post-1980, do not represent closed economies. If this counter-argument is accepted, it is tantamount to accepting that RZ cannot explain financial under-development post 1980.

A more persuasive caveat to our proposed test of the strict version of RZ is that if both partial derivatives are positive when an economy is closed, opening both the trade and capital accounts will have a larger impact on financial development than opening either. Hence, 'simultaneous' opening could have a large positive impact on financial development, which is one of the other predictions of RZ. Thus, one of the predictions of RZ may be refuted while another prediction may receive empirical support – a classic case of mixed evidence.

Hypothesis II on the other hand appears much more straightforward. If β_4 is positive and significant, it would be legitimate to conclude that improvements in economic institutions are likely to have a positive influence on financial development. However, to examine its policy implications, some additional calculations would be useful.

The caveat on the interpretation of the estimated coefficients on the variables of interest is that to the extent that there is an overlap between the two hypotheses, it may impact on the statistical significance of the variables, resulting in erroneous conclusions. For example, greater trade and financial openness, through political economy actions, may result in better economic institutions, i.e. institutions may be the channel that captures some, if not all, the effects of openness. Thus, including both sets of variables in the empirical model may result in insignificant coefficients throughout because of over-parameterisation or just for the openness variables. For this reason, we

estimate models with and without the institutions variable, which allows us to have a purer test of the openness hypothesis.

A final comment that needs to be made on the interpretation of the estimated coefficients is that the presence of the lagged dependent variable in the model means that all the estimated beta coefficients represent short-run effects. The long-run effects can be derived by dividing each of the betas by 1- γ, the coefficient of the lagged dependent variable.

Dynamic Panel GMM Estimation

The inclusion of the lagged dependent variable in the empirical model implies that there is correlation between the regressors and the error term since lagged financial development depends on u_{it-1} which is a function of the μ_i - the country fixed effects. Because of this correlation, dynamic panel data estimation of equation (1) suffers from the Nickell (1981) bias, which disappears only if T tends to infinity. The preferred estimator in this case is GMM suggested by Arellano and Bond (1991), which basically differences the model to get rid of country specific effects or any time invariant country specific variable. This also eliminates any endogeneity that may be due to the correlation of these country specific effects and the right hand side regressors.[19]

The moment conditions utilize the orthogonality conditions between the differenced errors and lagged values of the dependent variable. This assumes that the original disturbances in (1) – the ν_{it} - are serially uncorrelated and that the differenced error is, therefore, MA(1) with unit root. To this end, two diagnostics are computed using the Arellano and Bond GMM procedure to test for first order and second order serial correlation in the disturbances. One should reject the null of the absence of first order serial correlation and not reject the absence of second order serial correlation.

A special feature of dynamic panel data GMM estimation is that the number of moment conditions increase with T. Therefore, a Sargan test is performed to test the over-identification restrictions. There is convincing evidence that too many moment conditions introduce bias while increasing efficiency. It is, therefore, suggested that a subset of these moment conditions be used to take advantage of the trade-off between the reduction in bias and the loss in efficiency (See Baltagi, 2005, and the references cited there). For example, for the data set used in Table 2 with N=42 countries and T=22, we restrict the moment conditions to a maximum of two lags on the dependent variable. This yields a Sargan statistic that is asymptotically distributed as Chi-squared with 42

[19] An additional advantage of the GMM estimator is that by differencing it helps to ensure that all the regressors are stationary.

degrees of freedom, i.e., 42 over-identification restrictions. On the other hand for the data set underlying Table 3 with N=31 countries and T=7, using all the moment conditions implied by the Arellano and Bond GMM procedure yields 13 over-identification restrictions.

3. Data and Sources

We utilise four data sets to estimate equation 1, corresponding to two different measures of financial openness and two sets of financial development indicators. This section outlines the data and estimation methods.

The first measure of financial openness is the financial globalization indicator constructed by Lane and Milesi-Feretti (2006), which we collect for 42 developing countries during 1980-2003. This indicator is defined as the volume of a country's foreign assets and liabilities (% of GDP). At any given point in time, this measure provides a useful summary of a country's history of financial openness, which for our purposes is an advantage over flow-based measures like the WDI measure of gross private capital flows, which place all the emphasis on the current observation.[20] This is because the political economy factors which we are trying to capture with this measure, such as the power of financial incumbents, are unlikely to display as much variability as private capital flows.

The second measure of financial openness is the financial liberalization measure constructed by Abiad and Mody (2005), which is available annually for a group of 34 developed and developing countries for the period 1980-1996. This is an excellent measure of financial liberalization, in that it captures six different aspects of liberalization, comprising credit controls, interest rate controls, entry barriers, regulations, privatisation, and international transactions. It has a much wider range than most other indicators of financial liberalization – from 0 to 18 – which is extremely useful for estimation purposes. Its main disadvantage is that it may be too broad for our specific purpose: 'international transactions' is just one of the six aspects of financial liberalization. However, it could be argued that even domestic financial liberalization contributes to financial openness; for example, removing entry barriers and regulations may create more competition for financial incumbents, even if it is from within. Moreover, the broadness of the indicator needs to be counter-balanced against its wide range: capital account liberalization indicators are usually little more than dummies taking the values 0 or 1.

[20] In an earlier version of the paper we did use the WDI measure of gross capital flows. The results were qualitatively not dissimilar even though, were somewhat less satisfactory in terms of diagnostics and significance of the interaction term.

The first set of financial development indicators contains three standard banking development indicators, namely *liquid liabilities*, *private credit* and *domestic credit* provided by the banking sector (all as % of GDP). The second set consists of one capital market development indicator, namely *number of companies listed* (% of population in million). The source for the latter, which is available annually for a shorter period than the banking indicators, is World Development Indicators. Clearly, each of these indicators captures a different aspect of financial development and has its own strengths and weaknesses. Among the banking indicators, *Private Credit* is probably the most relevant to measure opportunities for new firms, or as Rajan and Zingales put it "the ease with which any entrepreneur or company with a sound project can obtain finance" (p. 9). *Liquid Liabilities* measures the ability of banks to mobilise funds or the size of the banking system relative to the economy, but the funds are not always used to finance new entrepreneurs, so this is not as good an indicator of financial development in the RZ sense. *Domestic Credit* comprises private credit as well as credit to the public sector, thus it is probably the least well suited to capture financial development in the RZ sense. Among stock market indicators, *Number of companies listed* is arguably the one that is closest to the RZ hypothesis, in that it reflects the degree of access to the capital market by new companies.[21]

Annual data on real GDP per capita, converted to US dollars based on 2000 constant prices, is also from the World Development Indicators. Trade openness is measured by the ratio of total trade to GDP, also from World Development Indicators. Institutional quality data is from the International Country Risk Guide (ICRG) – a monthly publication of Political Risk Services (PRS). Following Knack and Keefer (1995), five PRS indicators are used to measure economic institutions, namely: (i) *Corruption* (ii) *Rule of Law* (iii) *Bureaucratic Quality* (iv) *Government Repudiation of Contracts* and (v) *Risk of Expropriation*; higher values of these indicators - the first three of which are scaled from 0 to 6 and the other two from 0 to 10 - imply better institutional quality. Since all these aspects of the institutional environment are likely to be relevant for the security of property rights,

[21] In earlier versions of the paper we also used other stock market development indicators, such as turnover, value traded and market capitalisation. However, these indicators are susceptible to measurement error due to differences in international definitions, excess volatility and possible unit roots in stock prices. Because of this, the results were less satisfactory. The openness terms were not significant in the liquidity equations, while the lagged dependent variable in the stock market capitalisation equations was statistically close to unity suggesting the presence of a unit root (which accords well with the random walk in stock prices hypothesis).

we bundle them into a single summary measure by summing them up (after appropriate re-scaling).[22] Thus, the theoretical range of this index is 0 to 50.

The four data sets are summarised in Tables 1a-1d; 1a and 1b correspond to the datasets underlying the results in Table 2 while 1c and 1d correspond to the data sets used in the regressions reported in Table 3. Tables 1a-1d provide the definition and source of each variable, its unit of measurement and summary statistics, the sample period and countries for which these variables are collected. In addition, the correlations matrix between the variables in each of the data sets is also provided. It can be seen that all the variables, including the institutions index, display considerable variation both between and within countries, justifying the use of panel estimation techniques. Moreover, the correlations coefficients between the various financial development indicators are positive, as would be expected. The correlation coefficient between trade openness and financial globalization is 0.48 in Dataset 1 and 0.67 in Dataset 2. The correlation between trade openness and financial liberalization is also positive but much lower: 0.22 in Dataset 3 and 0.18 in Dataset 4. The correlation coefficient between institutional quality and trade openness is 0.36, 0.30, 0.03 and -0.01 in Datasets 1, 2, 3 and 4, respectively. The correlation coefficient between institutional quality and financial globalization is 0.21 in Dataset 1 and 0.08 in Dataset 2. The correlation coefficient between institutional quality and financial liberalization, however, is much higher: 0.62 in Dataset 3 and 0.58 in Dataset 4. Finally, the correlation coefficient between real GDP per capita and the other regressors ranges between 0.03 (with financial globalization in Dataset 1) and 0.70 (with institutional quality in Dataset 3). Thus, the summary statistics allow us to conclude that there is a reasonable degree of independent variation in the data, which should allow the identification of the various parameters of interest.

4. Empirical Results

This section reports the results of estimating Equation (1) on the four data sets using Dynamic GMM estimation and their implications for the hypotheses of interest. It also reports the results of a variety of robustness checks that check the sensitivity of the results to different estimation strategies.

Estimation Results

[22] The scale of corruption, bureaucratic quality and rule of law was first converted to 0 to 10 (multiplying them by 5/3) to make them comparable to the other indicators.

The estimation results are presented in Tables 2 and 3. Table 2 reports the results using the two developing/emerging country data sets, which utilise the financial globalization measure to proxy financial openness. Table 3 reports the results using the two developed & developing countries datasets, which utilize the financial liberalization measure to proxy financial openness. All the diagnostics in both tables are satisfactory in all cases. Specifically, the Sargan test does not reject the over-identification restrictions, the absence of first order serial correlation is rejected and the absence of second order serial correlation is not rejected. Moreover, all the lagged dependent variables in all cases are positive and significant, with coefficients that are significantly below unity, ruling out explosive behaviour. We therefore conclude that our choice of Dynamic GMM as the preferred panel estimator is confirmed by the data, suggesting that our estimates have good statistical properties. We now turn to discuss the estimates in some detail, with particular emphasis the evidence they provide for the hypotheses of interest.

Starting from the models explaining the banking indicators in Table 2, we can observe that real GDP per capita enters with a positive and significant coefficient throughout, suggesting that economic development has a positive impact on financial development, as expected. In all six cases, both openness terms enter with positive and highly significant coefficients, while the interaction between trade and financial openness is negative and also highly significant. Economic institutions enter with positive and highly significant coefficients in the *Private Credit* and *Domestic Credit* equations but are not significant in the *Liquid Liabilities* equation. In Model 4, which explains the *Number of Listed Companies*, real GDP is positive but not significant. Both openness terms enter with positive and highly significant coefficients while the interaction term enters with a negative and significant coefficient. Economic institutions enter with a small negative coefficient that is statistically insignificant. Throughout Table 2 all the estimated coefficients have plausible values, suggesting that the equations are well behaved.

In Table 3, we can observe that real GDP per capita enters with a positive coefficient throughout all the models, even though it is smaller in magnitude in the *Listed Companies* regression than in the regressions explaining the banking indicators. However, the number of openness terms that are significant in Table 3 is less than those in Table 2. Specifically, trade openness is not significant in Model 5a and Models 6 and 7, but is significant in Models 8 and 5b. Financial liberalization enters with a positive and highly significant coefficient in Models 5, 7 and 8. It also enters with a positive but insignificant coefficient in Model 6. The interaction term is negative and significant in 5 out of

8 cases, albeit with relatively small coefficients. Economic institutions enter with positive and significant coefficient in all the banking development equations and a negative and significant coefficient in the *Number of Listed Companies* regression. The latter may well reflect the possibility that better institutions are also associated with higher costs in setting up companies – i.e. more red tape.

The broad conclusion we draw from Table 3, is that the coefficient of trade openness is significant only for the *Number of Listed Companies,* while the coefficient of financial liberalization is a significant determinant of financial development, in so far as this is measured by credit indicators and the number of listed companies. Interestingly, trade openness is positive and significant in Model 5(b) which excludes institutions. The evidence here therefore suggests that there may be an overlap between trade openness and institutions, suggesting that openness may indeed be working through institutions in this particular case. However, this is the only case for which we have evidence that there may be an overlap between the two hypotheses of interest – in all the other cases excluding institutions from the equation makes no qualitative difference to the results. This is true in both Tables 2 and 3.

Robustness Checks

A variety of robustness checks were carried out to examine the sensitivity of the results to alternative estimation strategies.

The first set of robustness checks involved using non-overlapping five year average data instead of annual data in the estimations. Given the need to use first differences and lags in the estimation, this was only feasible for the first data set for which we have 24 annual observations. Even with this set, with the differencing and lagging, the number of time series observations declines to just 3. The results shown in Table 4 are similar to those in Table 2 in terms of sign and significance, but the magnitudes are different, as expected. Clearly the dynamics are now different, as would be expected by removing cyclical fluctuations. The lagged dependent variable now enters with a much smaller coefficient than in the estimations using annual data, which remains, however, significant in the private credit and domestic credit regressions. Thus, both these equations were estimated by the Arellano-Bond method. However, because the Arellano and Bond estimations revealed that the lagged dependent variable was not significant in the liquid liabilities regression, this equation was estimated by the fixed effects (within) estimator. Table 4 therefore reports the estimation results of the latter, which is a more appropriate estimator in the absence of significant dynamics.

The diagnostics of all the models presented in Table 4 are satisfactory, suggesting that the models are well specified and the estimators chosen are appropriate. Lagged GDP is positive and highly significant in all models, suggesting that the level of economic development is an important determinant of the degree of banking development. Both the openness terms and economic institutions are positive and significant in the private credit equation while the interaction term is negative and significant. While the coefficient estimates are higher compared to Model 1(a) which was estimated with annual data, the differences are much smaller when the implied long-run coefficients are calculated in both cases. Importantly, the qualitative nature of the results remains unaltered in the case of the private credit regression. The results are somewhat weaker in the case of domestic credit and liquid liabilities. In particular, while GDP, institutions and trade openness enter with positive and significant coefficients at conventional levels, the significance of financial openness and the interaction term is weaker. The weakening of the results that is observed by using 5-year non-overlapping average data is not surprising since the transformation of the annual data into five year non-overlapping averages, results in information loss.

We have also carried out a large number of other robustness checks that are not reported in the tables due to space limitations. These included using contemporaneous values of the regressors, using different estimators etc. All these checks confirmed the robustness of our main results. Using contemporaneous values of the regressors simply results in higher values for the coefficients for the openness terms, which may reflect an upward bias due to reverse causality. The coefficient on GDP is, however, sensitive to this change: using the contemporaneous value of GDP in the estimations instead of the lagged value results in a negative coefficient for GDP, which may reflect business cycle and/or monetary policy considerations. When GDP is growing too rapidly, all other things equal, central banks tend to pull the brake, typically reflected in a slowing down of bank credit. Lagging GDP per capita while using contemporaneous values of the regressors returns a positive and significant coefficient on GDP, while the coefficients on the openness terms and economic institutions remain largely unchanged. We also re-estimated some of the models using the fixed effects two stage least squares estimator, which is less efficient than the Arellano and Bond estimator. These estimations resulted in very similar qualitative results as those reported here. Finally, we also used additional indicators of capital market development, such as stock market turnover, stock market liquidity and market capitalization. The results were weaker for the first two indicators; however, there are well known international comparability issues with these indicators (see Rajan and Zingales, 2003), which makes panel estimation inappropriate. The results using

stock market capitalization suggested explosive dynamics, with the coefficient in the lagged dependent variable being statistically not different to unity, making Arellano and Bond estimation inappropriate. The latter may reflect the presence of a unit root in stock prices, since market capitalization reflects the movements of the stock market price index, which under weak form efficiency should evolve as a random walk.

To conclude, the variety of robustness checks we carried out, confirm both the robustness of our empirical results as well as the appropriateness of the indicators used and our estimation strategy.

Comparisons with earlier studies

Our results, particularly those relating to the private credit indicator can be compared with those of Chinn and Ito (2006) who also use the same indicator. However, some caution should be exercised in making such comparisons not least because the model specifications are not identical, the estimation procedures are not the same and the datasets and data frequencies used for estimation are different. Moreover, the Chinn and Ito indicator of financial openness – their own capital account liberalization index – is vastly different from the two indicators of financial openness that we utilize. Notwithstanding these important differences, it is still useful to carry out such a comparison, not least because it would help to clarify the extent of the current contribution in the context of related literature.

In their private credit equation in Table 2.3, Chinn and Ito identify only two statistically significant determinants of private credit at the conventional 5% level, namely (i) their capital account liberalization index (ii) the lagged level of private credit. Trade openness, per capita income, their institutional/legal variable and their interaction variable are all insignificant. In their private credit equations reported in Table 2.4, which use four different legal indicators, but do not report the estimated parameters of the conditioning variables, none of the variables is shown to be statistically significant at conventional levels. In sharp contrast, in both the private credit equations we report in Table 2 all the variables entered, including GDP per capita, trade openness, financial openness, and economic institutions appear with positive coefficients that are significant at the 1% level. Moreover, the interaction between financial and trade openness is also significant at the 1% level, with its negative coefficient indicating diminishing returns to openness to which we have alluded. These are, of course, important differences that we believe reflect the superiority of our empirical strategy, i.e. using annual data and the Arellano and Bond estimator. Indeed, the results do weaken somewhat in table 4 where we also use 5-year panels, suggesting that the use of annual data does

make a difference in identifying the parameters more precisely. However, even where we use 5-year averages all the variables remain significant at conventional levels. Hence the strength of the results must also reflect the choice of estimator, the differences between the financial openness indicators[23] used and, possibly, model specification.[24]

5. Hypotheses Testing and Policy Implications[25]

This section provides evidence on the hypotheses of interest by calculating the marginal effects of openness and economic institutions. It also discusses the broader policy implications of our findings.

Openness and Financial Development

In order to shed light on RZ we evaluate the partial derivatives of each of the financial development indicators with respect to each type of openness using equations (2) and (3). Given that these derivatives vary within the sample depending on the level of financial or trade openness, respectively, we calculate them at the mean, minimum and maximum values of financial (trade) openness. Because we have two specifications for each model, we utilize the specification that includes economic institutions if the latter variable is significant or the one that excludes institutions where it is found to be insignificant.[26]

The summary statistics of the derivatives of financial development indicators with respect to trade openness are presented in Table 5a. Those with respect to financial openness are presented in Table 5b.

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[23] In preliminary work we carried out for this paper we also used the Chinn and Ito indicator of capital account openness and found it to be statistically insignificant. Chin and Ito find it significant in some of their regressions, particularly those that explain equity market development.

[24] The differences with Chinn and Ito (2006) are somewhat less striking when we compare their findings in Table 2.3 with the results we report in Table 3. This is because when we control for institutions we too find trade openness to be insignificant. However, we continue to find income per capita and economic institutions correctly signed and significant and our interaction term, which has a negative sign, is also significant. Moreover, trade openness does become significant when institutional quality is excluded. Given the differences in the datasets used to produce the results in Tables 2 and 3, it may be argued that trade openness plays a much greater role in promoting financial development in developing countries than in developed ones. When both types are included in the dataset the contribution of openness weakens.

[25] The discussion in this section – like any policy implications drawn from reduced form regressions - is subject to the usual caveat of the Lucas critique. To the extent that this critique is valid, a reduced form relationship may well evaporate into thin air if the policy maker attempts to exploit it.

[26] The marginal effects of openness are larger if we use the models that exclude institutions. A case can be made for using those models if it is accepted that improvements in economic institutions are mainly driven by increased openness. However, the balance of the evidence in Tables 2 and 3 suggests that the estimated parameters of the openness terms change little when economic institutions is excluded. The only exception is Model 5 for which we use specification 5(b), notwithstanding the statistical significance of economic institutions in 5(a).

The derivatives at the minimum values of openness allow us to comment on the strict version of RZ. The summary statistics also allow us to make inferences about the sum of the two derivatives at various points in the distribution, which, as explained in Section 3, sheds light on the loose version of RZ. In order to provide more evidence on the latter, we also calculate the sum of the two derivatives for each country-year (not reported in the tables).

At the mean level of financial openness, the derivative of our four financial development indicators is negative, with the exceptions of Model 6(a) and 4(a); it is worth however noting that Model 6(a) has insignificant coefficients for both trade and financial openness and the interaction term.

However, when these derivatives are evaluated at the minimum level of financial openness all but one are positive, and in some instances (e.g. Model 1a) quite large. At the other end of the spectrum, when financial openness is at its maximum value, all but one of the derivatives of the financial development indicators with respect to trade openness is negative. At the mean level of trade openness, most of the derivatives of the financial development indicators with respect to trade openness are positive. When evaluated at the minimum level of trade openness, these derivatives are positive without exception, with the largest ones corresponding to private credit and companies listed. At the other end of the spectrum, at the highest level of trade openness, all of these derivatives are negative with just one exception – companies listed.

Given these summary statistics, it is clear that the loose version of RZ receives empirical support from the most closed economies, where it appears to hold, but receives no support from the most open economies in the sample. The additional calculations carried out suggest that the looser version of RZ holds within the sample for a relatively small number of country-years. This is particularly true in the case of the banking development indicators. In the case of private credit (Model 1a), these include Bangladesh (23 years), Cameroon (2 years), Ethiopia (9 years), Ghana (6 years), India (all 24 years), Mexico (3 years), Nigeria (1 year), Pakistan (6 years), Paraguay (1 year), Syria (1 year), Turkey (10 years), and Zimbabwe (5 years). A very similar picture emerges for domestic credit (Model 3a) while in the case of liquid liabilities (Model 2b), the hypothesis hold for a wider range of country-years, which in terms of countries additionally include Algeria, Indonesia, Korea, Thailand, Uruguay. Interestingly, at the end of the sample in 2003, the hypothesis receives support only from India in the case of both credit indicators and additionally from Bangladesh in the case of liquid liabilities. A similar picture emerges when using the sample of developed and developing economies that ends in 1996. By that year, the sum of the two private

credit derivatives remains positive only in a handful of countries (Bangladesh, India, Argentina, Brazil, Japan).

In the case of the capital market indicator, however, the loose version of RZ has wider applicability in the samples utilized, as indicated by the summary statistics. Indeed further calculations confirm that even at the end of the sample backing Model 4(a) in 2003, the sum of the two derivatives is positive for twelve countries (Bangladesh, Egypt, India, Indonesia, Korea, Mexico, Morocco, Pakistan, Peru, Turkey, Venezuela, Zimbabwe). Using Model 8(a), this is true of twenty countries in 1996 – almost two thirds of the countries in that sample.

With one exception, the marginal effects of trade and financial openness have by and large positive values when financial and trade openness, respectively, are at their minimum values. This is true of both banking system and capital market development indicators. This contradicts the strict version of RZ which stipulates that trade (or financial) openness alone will not deliver financial development. In the only case where the marginal effect is negative, which corresponds to the derivative of domestic credit with respect to trade openness - Model 7(a) in Table 5a – the marginal effect does not increase with greater financial openness as would be implied by RZ.

We conclude that the evidence from the banking development indicators is to some degree supportive of the loose interpretation of RZ, in that the most closed economies are likely to benefit from simultaneous opening of trade and capital accounts, but not supportive of the strict version. The evidence in favor of the loose version of RZ is much stronger when one considers the capital market development indicator used in this study than the banking system development indicators. Thus, the simultaneous openness hypothesis appears to hold more promise for the development of capital markets than the development of banking systems.

Our results seem to suggest the presence of sharply diminishing returns to openness, broadly defined to include both trade and financial openness. The least open countries stand to benefit most in terms of financial development by opening up either their trade or their capital accounts and the effects are larger if they open both. At the other end of the spectrum, the most open countries stand to benefit least from additional openness. Indeed, further examination of the variation of the values of these derivatives across countries and over time suggests that the values of both derivatives have been steadily declining during the sample period as a result of increased openness over time. Using Dataset 1 we find that by the end of the sample in 2003, all the country derivatives of private credit with respect to trade openness are negative. On the other hand, the derivative of private credit with

respect to financial openness in the same year remains positive for the following countries (ranked in descending order with values in parentheses): India (0.1019), Bangladesh (0.0753), Pakistan (0.0352), Niger (0.0330), Guatemala (0.0173), Venezuela (0.0098), and Zimbabwe (0.0088).

A more promising picture emerges when examining the derivatives of our capital market indicator in Dataset 2, with both remaining positive at the end of the sample period for almost half of the countries in the sample, even though both have been declining over time. Specifically, the derivative of the number of listed companies with respect to trade openness in 2003 remains positive in the case of the following ten countries (ranked in descending order with values in parentheses): Bangladesh (0.1181), India (0.1040), Zimbabwe (0.0657), Mexico (0.0542), Pakistan (0.0454), Korea (0.0219), Indonesia (0.0190), Turkey (0.0112), Egypt (0.0039), Peru (0.0034). The derivative of the same variable with respect to financial openness in 2003 is positive for the following sixteen countries: India (0.1553), Bangladesh (0.1391), Peru (0.1349), Pakistan (0.1148), Egypt (0.1005), Venezuela (0.0994), Zimbabwe (0.0988), Uruguay (0.0902), Indonesia (0.0688), Mexico (0.0649), Turkey (0.0647), Chile (0.0436), Korea (0.0328), Morocco (0.0427), Nigeria (0.0040), Trinidad and Tobago (0.0040).[27]

To conclude, the empirical distribution of the marginal effects of openness within the sample suggests that additional openness may be more effective in promoting capital market development than banking system development, with financial openness offering more scope for advancing financial development than trade openness. Additional trade openness is unlikely to deliver any stimulus to banking sector development in any country but may well help to boost the development of capital markets in a few countries, particularly those that do not have very open capital accounts, such as Bangladesh, India, Mexico, Zimbabwe and Pakistan. Additional financial openness is likely to provide a stimulus to banking sector development in a similar small group of countries but may impact positively on capital market development in a much wider range of countries.

Economic Institutions and Financial Development

The evidence on Hypothesis II is also mixed. In Table 2 economic institutions enter significantly with a fairly large positive coefficient in both the private and domestic credit equations alongside

[27] The discussion focuses on Datasets 1 and 2, which are more recent and therefore more relevant for policy analysis. However, similar results are obtained using Datasets 3 and 4. Using Dataset 3, the derivative of private credit with respect to trade openness is also negative at the end of the sample (1996) in all countries, but is positive with respect to financial openness for all but two countries. Using Dataset 4, we find that the derivative of the number of listed companies at the end of the sample (1996) with respect to financial openness is positive for all but one country while with respect to trade openness it is positive for just five countries (India, Argentina, Brazil, Japan and US).

significant coefficients for all the openness terms, suggesting an independent influence. However, it is not significant in both the liquid liabilities and listed companies equations. In Table 3, economic institutions enter significantly and with a positive coefficient in all three banking development equations. However, they enter with a negative and significant coefficient in the listed companies equation, which clearly contradicts this Hypothesis. The latter may of course reflect the fact that the sample includes several developed economies for which the variable may be acting like a proxy for 'red tape' or the bureaucratic cost of establishing new companies.

Improvements in economic institutions are likely to have a large impact in countries with low institutional scores. This alternative channel of banking sector development may be particularly useful to low income countries[28] that are already open, which stand to benefit little in terms of additional openness. Examples of such countries in our datasets include Cameroon, Ethiopia, Gabon, Ghana, Kenya, Malawi, Nigeria, Senegal, Togo and Zambia. If, for instance, Togo were to increase its institutions score of 18.8 in 2003 to the sample mean for that year (33.1) – an increase of just under two standard deviations - then its ratio of private credit to GDP is predicted to increase by around 16 percent.

6. Concluding Remarks

The results presented in this paper suggest that openness, as well as economic institutions, are statistically important determinants of the variation in financial development across countries and over time since the 1980s. Our findings, which are obtained utilising four different data sets, are robust to the measurement of financial development, the indicator of financial openness utilised and alternative estimation procedures and methods.

We find mixed evidence on RZ. While the simultaneous opening of both trade and capital accounts may have a large positive impact on financial development in economies that are relatively closed, it does not appear to be a necessary condition for financial development to take place. This finding may be good news for policy makers facing political constraints that prevent simultaneous opening of both trade and capital accounts. An added bonus for policy makers is that economic institutions appear to have an independent influence on banking sector development – but not capital market development - over and above that of trade and financial openness.

[28] Using the World Bank classification of low income countries.

Our results offer mixed blessing for policy makers in low income countries aspiring to develop their economies by developing their financial systems. There is good news for policy makers in low income countries that are relatively closed, since opening up their trade and/or capital accounts may provide an effective stimulus to financial development. In our developing country data set prime examples of such countries are Bangladesh, Ghana, India and Pakistan. At the other end of the spectrum, low income countries that are already very open, such as Malawi, Senegal, Togo and Zambia, need to focus on improving their institutional infrastructure in order to grow their financial systems.

The empirical distribution of the marginal effects of openness within the sample suggests that additional openness may be more effective in promoting capital market development than banking system development, while financial openness offers greater scope for advancing financial development than trade openness. This analysis also suggests that additional trade openness is unlikely to deliver any stimulus to banking sector development in any country but may well help to boost the development of capital markets in a few countries, particularly those that do not have very open capital accounts, such as Bangladesh, India, Mexico, Zimbabwe and Pakistan. Additional financial openness is likely to provide a stimulus to banking sector development in a similar small group of countries but may impact positively on capital market development in a much wider range of countries.

The empirical evidence presented in this paper confirms the quantitative importance of the mechanisms of financial development that have been highlighted by recent literature that emphasises political economy factors. However, it also suggests that these mechanisms are not working in exactly the same ways envisaged by this literature, suggesting that more nuanced explanations may be needed. This may to some extent reflect the lack of formal modelling that is typical of this literature, which inevitably results in broad brush conclusions that do not provide very clear predictions for empirical work. Such modelling is needed not only to guide future empirical work in the area but also to deepen our understanding of the political economy mechanisms that shape financial and economic development.

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Table 1a: Summary of Data Set 1
Annual data: 1980-2003 Observations = 1008

Variable	Source	Unit of measurement	Mean	Overall Standard Deviation	Between Standard Deviation	Within Standard deviation	Minimum	Maximum
Private credit	WDI	% of GDP	31.33	24.80	21.99	11.93	1.54	165.72
Liquid liabilities	WDI	% of GDP	41.40	24.64	22.47	10.66	3.80	141.93
Domestic credit	WDI	% of GDP	47.24	27.71	23.92	14.44	0.60	164.09
Real GDP per capita	WDI	US Dollars at 2000 prices	1800.00	1856.10	1791.86	554.70	74.74	12235.67
Trade openness	WDI	% of GDP	63.62	27.09	23.89	13.28	6.32	209.49
Financial globalization	Lane and Milesi-Ferreti (2006)	% of GDP	111.28	54.02	41.18	35.50	7.35	378.48
Institutional Quality	ICRG	Sum of corruption, rule of law, bureaucratic quality, government repudiation of contracts, risk of expropriation (each scaled 1 to 10).	27.22	8.43	5.65	6.32	8	45
Countries N=42	Algeria, Bangladesh, Bolivia, Botswana, Cameroon, Chile, Costa Rica, Ecuador, Egypt, El Salvador, Ethiopia, Gabon, Ghana, Guatemala, Honduras, India, Indonesia, Jamaica, Jordan, Kenya, Korea, Malawi, Malaysia, Mexico, Morocco, Nigeria, Niger, Pakistan, Paraguay, Philippines, Senegal, Sri Lanka, Syria, Thailand, Togo, Trinidad and Tobago, Tunisia, Turkey, Uruguay, Venezuela, Zambia, Zimbabwe.						

Correlations Matrix

	Private credit	**Liquid liabilities**	**Domestic credit**	**Real GDP per capita**	**Trade openness**	**Financial globalization**	**Institutional Quality**
Private credit	1.0000						
Liquid liabilities	0.7597	1.0000					
Domestic credit	0.8010	0.8386	1.0000				
Real GDP per capita	0.3375	0.2051	0.1783	1.0000			
Trade openness	0.5162	0.5072	0.4165	0.1746	1.0000		
Financial globalization	0.0913	0.2013	0.1582	0.0320	0.4884	1.0000	
Institutional Quality	0.3909	0.3853	0.2906	0.4183	0.3653	0.2090	1.0000

Table 1b: Summary of Data Set 2
Annual data: 1988-1999 Observations = 252

Variable	Source	Unit of measurement	Mean	Overall Standard Deviation	Between Standard Deviation	Within Standard deviation	Minimum	Maximum
Number of (domestic) listed companies	WDI	% of (million) population	9.48	8.70	8.58	2.31	0.14	35.96
Real GDP per capita	WDI	US Dollars at 2000 prices	2524.49	2191.58	2198.38	426.55	250.07	10122.07
Trade openness	WDI	% of GDP	64.92	36.40	35.32	11.51	13.74	217.57
Financial globalization	Lane and Milesi-Ferreti (2006)	% of GDP	109.06	49.97	44.88	23.90	24.75	299.34
Institutional Quality	ICRG	Sum of: corruption, rule of law, bureaucratic quality, government repudiation of contracts, risk of expropriation (each scaled 1 to 10).	31.20	6.96	4.54	5.36	10.33	45
Countries N=21	Bangladesh, Chile, Egypt, India, Indonesia, Jamaica, Jordan, Korea, Malaysia, Mexico, Morocco, Nigeria, Pakistan, Peru, Philippines, Thailand, Trinidad &Tobago, Turkey, Uruguay, Venezuela, Zimbabwe.							

Correlations Matrix

	Number of (domestic) listed companies	**Real GDP per capita**	**Trade openness**	**Financial globalization**	**Institutional Quality**
Number of (domestic) listed companies	1.0000				
Real GDP per capita	0.3648	1.0000			
Trade openness	0.6418	0.1018	1.0000		
Financial globalization	0.4793	0.0683	0.6715	1.0000	
Institutional Quality	0.3012	0.4267	0.2999	0.0849	1.0000

Table 1c: Summary of Data Set 3
Annual data: 1980-1996 Observations = 544

Variable	Source	Unit of measurement	Mean	Overall Standard Deviation	Between Standard Deviation	Within Standard deviation	Minimum	Maximum
Private credit	WDI	% of GDP	51.33	38.81	36.15	15.42	0.96	184.65
Liquid liabilities	WDI	% of GDP	51.78	31.94	30.99	9.48	9.84	199.88
Domestic credit	WDI	% of GDP	70.19	44.58	41.50	17.81	8.35	257.60
Real GDP per capita	WDI	US Dollars at 2000 prices	7325.42	8447.34	8479.72	1253.91	181.01	36650.89
Trade openness	WDI	% of GDP	46.82	24.94	23.53	9.20	6.32	192.11
Financial liberalization	Abiad and Mody (2005)	Integer values from 0 to 18 (1 added to take logs)	9.36	5.49	4.57	3.15	1	19
Institutional Quality	ICRG	Sum of corruption, rule of law, bureaucratic quality, government repudiation of contracts, risk of expropriation (each scaled 1 to 10).	30.98	10.51	9.49	4.79	10	50
Countries* N=32	Argentina, Australia, Bangladesh, Brazil, Canada, Chile, Colombia, Egypt, France, Germany, Ghana, India, Indonesia, Israel, Italy, Japan, Korea, Malaysia, Mexico, Morocco, New Zealand, Pakistan, Peru, Philippines, South Africa, Sri Lanka, Thailand, Turkey, United Kingdom, United States, Venezuela, Zimbabwe.							

*The number of countries for Liquid Liabilities is 30 (due to missing data for France and UK) and 31 for Domestic Credit (Argentina excluded due to outliers).

Correlations Matrix

	Private credit	Liquid liabilities	Domestic credit	Real GDP per capita	Trade openness	Financial liberalization	Institutional Quality
Private credit	1.0000						
Liquid liabilities	--	1.0000					
Domestic credit	0.8424	--	1.0000				
Real GDP per capita	0.7577	0.6300	0.6967	1.0000			
Trade openness	0.1298	0.2704	0.1249	-0.1243	1.0000		
Financial liberalization	0.5978	0.3249	0.3513	0.5802	0.2213	1.0000	
Institutional Quality	0.6146	0.4937	0.4915	0.7025	0.0262	0.6191	1.0000

Table 1d: Summary of Data Set 4
Annual data 1988-1996 Observations=279

Variable	Source	Unit of measurement	Mean	Overall Standard Deviation	Between Standard Deviation	Within Standard deviation	Minimum	Maximum
Number of (domestic) listed companies	WDI	% of (million) population	813.96	1429.59	1419.997	292.192	24	8479
Real GDP per capita	WDI	US Dollars at 2000 prices	8158.50	9201.26	9315.42	619.24	263.54	36650.89
Trade openness	WDI	% of GDP	49.19	27.40	27.04	6.39	13.24	192.11
Financial liberalization	Abiad and Mody (2005)	Integer values from 0 to 18 (1 added to take logs)	11.51	4.75	4.26	2.23	1	19
Institutional Quality	ICRG	Sum of: corruption, rule of law, bureaucratic quality, government repudiation of contracts, risk of expropriation (each scaled 1 to 10).	33.45	9.46	8.56	4.28	10.33	50
Countries N=31	Argentina, Australia, Bangladesh, Brazil, Canada, Chile, Colombia, Egypt, France, Germany, India, Indonesia, Israel, Italy, Japan, Korea, Malaysia, Mexico, Morocco, New Zealand, Pakistan, Peru, Philippines, South Africa, Sri Lanka, Thailand, Turkey, United Kingdom, United States, Venezuela, Zimbabwe.							

Correlations Matrix

	Number of (domestic) listed companies	**Real GDP per capita**	**Trade openness**	**Financial liberalization**	**Institutional Quality**
Number of (domestic) listed companies	1.0000				
Real GDP per capita	0.5093	1.0000			
Trade openness	-0.2845	-0.1879	1.0000		
Financial liberalization	0.2109	0.6004	0.1784	1.0000	
Institutional Quality	0.4174	0.6773	-0.0101	0.5801	1.0000

Table 2: Determinants of Financial Development in Developing or Emerging Economies

	Model 1		Model 2		Model 3		Model 4	
Financial Development Indicator	**Private Credit**		**Liquid Liabilities**		**Domestic Credit**		**Number of Listed companies**	
Specification ref	1(a)	1(b)	2(a)	2(b)	3(a)	3(b)	4(a)	4(b)
Constant	-0.012*** (0.002)	-0.005*** (0.001)	0.007*** (0.002)	0.008*** (0.002)	-0.008*** (0.001)	-0.003* (0.002)	0.026 (0.004)	- 0.002 (0.004)
Lagged Dependent Variable	0.829*** (0.045)	0.877*** (0.048)	0.282*** (0.061)	0.291*** (0.063)	0.625*** (0.019)	0.614*** (0.020)	0.586*** (0.057)	0.546*** (0.053)
Real GDP per capita	0.575*** (0.075)	0.611*** (0.066)	0.122** (0.061)	0.124** (0.061)	0.329*** (0.080)	0.314*** (0.067)	0.119 (0.166)	0.245 (0.160)
Trade Openness	0.816*** (0.300)	0.910*** (0.288)	0.363*** (0.056)	0.367*** (0.054)	0.304*** (0.071)	0.389*** (0.066)	0.745*** (0.297)	0.661*** (0.226)
Financial Globalization	0.881*** (0.227)	0.945*** (0.216)	0.281*** (0.063)	0.278*** (0.054)	0.250*** (0.061)	0.269*** (0.055)	0.670*** (0.289)	0.628*** (0.222)
Interaction term: Trade Openness x Financial Globalization	-0.228*** (0.061)	-0.250*** (0.058)	-0.228*** (0.061)	-0.083*** (0.013)	-0.074*** (0.016)	-0.088*** (0.015)	-0.156** (0.066)	-0.138** (0.049)
Economic Institutions	0.229*** (0.052)	----	0.009 (0.021)	----	0.144*** (0.037)	----	-0.061 (0.043)	---
Sample period	1980-2003	1980-2003	1980-2003	1980-2003	1980-2003	1980-2003	1990-1999	1990-1999
Estimation sample								
Number of years (T)	22	22	22	22	22	22	10	10
Number of countries (N)	42	42	42	42	42	42	21	21
Sargan Test (p-value)	26.71 (0.97)	32.05 (0.97)	30.25 (0.912)	30.55 (0.91)	26.56 (0.97)	32.81 (0.84)	13.91 (0.73)	15.95 (0.60)
First order serial correlation test (p-value)	-3.66 (0.00)	-3.86 (0.00)	-2.50 (0.01)	-2.49 (0.01)	-3.38 (0.00)	-3.38 (0.00)	-2.44 (0.01)	-2.44 (0.01)
Second order serial correlation test (p-value)	0.71 (0.48)	0.82 (0.42)	-1.00 (0.32)	-0.99 (0.32)	-1.14 (0.25)	-1.11 (0.27)	-0.79 (0.43)	-0.61 (0.54)

Notes

1. All models are estimated using the Arellano and Bond dynamic panel GMM estimation. A maximum of two lags of the dependent variable are used as instruments. All regressors are lagged by one year.
2. Figures in parentheses are standard errors
3. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.
4. Significant time dummies are included in each model and are not shown to save space.

Table 3: Determinants of Financial Development in Developed and Developing or Emerging Economies

	Model 5		Model 6		Model 7		Model 8	
Financial Development Indicator	**Private Credit**		**Liquid Liabilities**		**Domestic Credit**		**Number of Listed companies**	
Specification ref	5(a)	5(b)	6(a)	6(b)	7(a)	7(b)	8(a)	8(b)
Constant	-0.009 (0.006)	-0.006*** (0.002)	-0.003*** (0.002)	0.024 (0.008)	-0.009*** (0.003)	-0.009*** (0.002)	0.015*** (0.002)	0.013*** (0.002)
Lagged Dependent Variable	0.716*** (0.026)	0.668*** (0.019)	0.528*** (0.040)	0.650*** (0.095)	0.634*** (0.046)	0.738*** (0.043)	0.541*** (0.021)	0.510*** (0.017)
Real GDP per capita	0.467** (0.208)	0.476*** (0.041)	0.289*** (0.044)	0.253*** (0.112)	0.526*** (0.062)	0.471*** (0.069)	0.179*** (0.048)	0.215*** (0.057)
Trade Openness	-0.060 (0.060)	0.127** (0.058)	0.036 (0.073)	0.069 (0.112)	-0.059 (0.042)	-0.019 (0.040)	0.430*** (0.030)	0.398*** (0.027)
Financial Liberalization	0.400*** (0.165)	0.461*** (0.214)	0.032 (0.083)	0.023 (0.093)	0.137*** (0.053)	0.098** (0.047)	0.439*** (0.020)	0.423*** (0.017)
Interaction term: Trade Openness x Financial Liberalization	-0.090** (0.045)	-0.010* (0.056)	0.001 (0.024)	0.005 (0.028)	-0.026* (0.015)	-0.017 (0.011)	-0.129*** (0.006)	-0.124*** (0.006)
Economic Institutions	0.095** (0.040)	--	0.064** (0.031)	--	0.096** (0.040)	--	-0.048*** (0.015)	--
Sample period	1980-1996	1980-1996	1980-1996	1980-1996	1980-1996	1980-1996	1988-1996	1988-1996
Estimation sample								
Number of years (T)	15	15	15	15	15	15	7	7
Number of countries (N)	32	32	30	30	31	31	15	15
Sargan Test (p-value)	14.60 (0.98)	18.15 (0.92)	25.82 (0.58)	14.12 (0.99)	20.52 (0.84)	19.25 (0.89)	21.86 (0.74)	21.77 (0.75)
First order serial correlation test (p-value)	-2.38 (0.02)	-2.28 (0.02)	-2.81 (0.00)	-2.77 (0.01)	-3.43 (0.00)	-3.60 (0.00)	-2.14 (0.03)	-2.09 (0.04)
Second order serial correlation test (p-value)	-0.71 (0.48)	-0.69 (0.49)	-1.30 (0.19)	-1.23 (0.22)	-0.64 (0.52)	-0.64 (0.52)	-1.32 (0.18)	-1.31 (0.19)

Notes

1. All models are estimated using the Arellano and Bond dynamic panel GMM estimation. A maximum of two lags of the dependent variable are used as instruments. All regressors are lagged by one year.
2. Figures in parentheses are standard errors
3. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively
4. Significant time dummies are included in each model and are not shown to save space.

Table 4: Robustness Checks Using Non-overlapping 5-year Average Data

	Model 9		**Model 10**		**Model 11**	
Financial Development Indicator	**Private Credit**		**Liquid Liabilities**		**Domestic Credit**	
Specification ref	9(a)	9(b)	10(a)	10(b)	11(a)	11(b)
Constant	-0.1361*** (0.040)	-0.005 (0.024)	-4.101** (1.780)	-3.499** (1.794)	-0.157*** (0.031)	-0.068** (0.030)
Lagged Dependent Variable	0.412*** (0.128)	0.542*** (0.119)	--	--	0.319*** (0.100)	0.336*** (0.105)
Real GDP per capita	0.596*** (0.171)	0.454*** (0.206)	0.510*** (0.135)	0.535*** (0.136)	0.457*** (0.151)	0.430** (0.199)
Trade Openness	3.504*** (1.241)	2.892*** (1.171)	0.949*** (0.360)	0.963*** (0.350)	2.110** (1.022)	2.044** (0.996)
Financial Globalization	2.157** (1.045)	1.310 (0.934)	0.374 (0.335)	0.321 (0.326)	1.330 (0.881)	1.034 (0.885)
Interaction term: Trade Openness x Financial Globalization	-0.625** (0.261)	-0.455* (0.239)	-0.122 (0.083)	-0.122 (0.083)	-0.357* (0.215)	-0.310 (0.212)
Economic Institutions	0.858*** (0.252)	--	0.252*** (0.122)	--	0.665*** (0.205)	--
Sample period	1980-2003	1980-2003	1980-2003	1980-2003	1980-2003	1980-2003
Estimation sample						
Number of periods (T)	3	3	4	4	3	3
Number of countries (N)	42	42	42	42	42	42
$\mathbf{R^2}$ **:** Within	--	--	0.3024	0.2767	--	--
Sargan Test (p-value)	5.54 (0.354)	6.06 (0.301)	--	--	9.06 (0.107)	11.71 (0.039)
First order serial correlation test (p-value)	-1.93 (0.05)	-2.45 (0.01)	--	--	-1.93 (0.05)	-1.59 (0.11)
Second order serial correlation test (p-value)	- 0.07 (0.94)	- 0.98 (0.33)	--	--	- 0.54 (0.59)	- 0.84 (0.40)

Notes

1. Models 9 and 11 are estimated using the Arellano and Bond dynamic panel GMM estimation. Model 10 is estimated using the fixed effects (within) estimator with robust standard errors. In all models GDP is lagged by one period.
2. Figures in parentheses are standard errors.
3. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.
4. Time dummies are included in each model and are not shown to save space.

Table 5a: Marginal Effects of Trade Openness

Financial development indicator (Specification ref)	Evaluated at		
	Mean Financial Openness	Minimum Financial Openness	Maximum Financial Openness
Private credit (1a)	-0.2295	0.3609	-0.5378
Private credit (5b)	-0.0760	0.1269	-0.1766
Liquid Liabilities (2b)	-0.0146	0.2008	-0.1271
Liquid Liabilities (6a)	0.0385*	0.0369*	0.0393*
Domestic Credit (3a)	-0.0371	0.1555	-0.1377
Domestic Credit (7a)	-0.1107	-0.0587	-0.1365
Number of Companies Listed (4a)	0.0269	0.2166	-0.1286
Number of Companies Listed (8a)	-0.0572	0.0952	-0.2508

Table 5b: Marginal Effects of Financial Openness

Financial development indicator (Specification ref)	Evaluated at		
	Mean Trade Openness	Minimum Trade Openness	Maximum Trade Openness
Private credit (1a)	-0.0468	0.4606	-0.3376
Private credit (5b)	0.0779	0.2709	-0.0813
Liquid Liabilities (2b)	-0.0603	0.1248	-0.1664
Liquid Liabilities (6a)	0.0355*	0.0340*	0.0368*
Domestic Credit (3a)	-0.0528	0.1128	-0.1477
Domestic Credit (7a)	0.0387	0.0888	-0.0013
Number of Companies Listed (4a)	0.0701	0.2656	-0.1169
Number of Companies Listed (8a)	0.1412	0.4394	0.0584

*Statistically insignificant coefficients.