Emerging Markets Financial Openness and Financial Development

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July 2006

Abstract

We examine the effect of financial openness on the development of financial systems in a panel of 35 emerging markets during the period of 1976 to 2003. A group of indicators including variables from banking sector, stock market, and national capital accounts are used as measures of financial openness and financial development. In addition, aggregate index measures are developed to incorporate information from different areas of the financial system. Our empirical results generally suggest that financial openness is the key determinant of cross-country differences in the development of financial systems. When testing financial openness against the development of the banking sector and stock market separately, we found strong and robust evidence that this link between openness and development exists in stock markets. Although a similar link is sometimes found with banking sectors, it is not robust to different indicators of financial openness and model specifications.

Key Words: emerging markets, financial openness, financial development

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1. Introduction

In the aftermath of emerging market currency crises, first Mexico in 1994 then Southeast Asia in 1997 and Russia in 1998, researchers and policy makers have debated on the role of foreign capital and the effects of financial liberalization (stock market or capital account) on economic stability and growth. A large line of research work provide evidence that development of a financial system is a key driver of economic growth [for example, Levine (1997, 2005); King and Levine (1993); Levine et al. (2000); Beck et al. (2000); Demirgüç-Kunt and Levine (1996); Demirgüç-Kunt and Maksimovic (1996); and Rajan and Zingales (2001)]. It is likely that financial openness, as the major form of financial liberalization, increases economic growth through its effect on financial development. In this paper, we examine the effects of emerging markets financial liberalization on financial development.

Financial systems in developed economies are frequently dominated by stock markets, however this is not the case in most emerging markets where stock markets are less developed, may be inefficient and corporate governance is weak. Financial openness in this study is defined as allowing foreign ownership of equity, and the facilitation and encouragement of international capital flows. Financial development is generally defined as increasing the efficiency of allocating financial resources and monitoring capital projects, through encouraging competition and increasing the importance of the financial system. In other words, development is about structure, size and efficiency of a financial system. Theory suggests financial liberalization can lead to development of financial systems through several channels. The liberalization process usually increases the efficiency of the financial system by weeding out inefficient financial institutions, and creating greater pressure for a reform of the financial infrastructure (Chinn and Ito 2005; Claesens et al. 2001; Stulz 1999; Stiglitz 2000). Such an improvement in financial infrastructure may alleviate information asymmetry, decrease adverse selection and moral hazard, and raise the availability of finance. Removing capital controls allows domestic and foreign investors to hold more diversified portfolios, the cost of capital decreases when an emerging market moves from segmentation to integration into the world (Bekaert and Harvey 2000, 2001; Henry 2000).

This paper contributes to the literature in several ways. First, empirical findings in the existing literature are mostly driven by data from developed countries. There has been less analysis of emerging markets. Our sample includes panel data of 35 major emerging markets that have significant stock markets during the period of 1976 to 2003. Second, most empirical work focuses on a particular sector of the financial system (bank or stock market), our approach look at a larger number of indicators that are used as proxies of financial openness and financial development including indicators of the banking system, stock market, and international capital flows. Third, our measures of financial openness and financial development are not subjective scores assigned based on qualitative information. We develop index measures that aggregate groups of indicators based on principal component analysis, and in this way our index measures are determined by the inner relationship of actual financial and economic variables. Fourth, our empirical results are robust to different ways of aggregating information that indicating the degree of financial openness and financial development, to both static and dynamic panel data models, and to different estimation methods involved.

We first test the effects of financial openness on financial development with individual openness measures, and then use the aggregate measures of financial openness. Our empirical results generally suggest that financial openness is the key determinant of cross-country differences in development of the financial system. When testing financial openness against the development of the banking sector and stock market separately, we found strong and robust evidence that this link between openness and development exists in stock markets. Although a similar link is sometimes found with banking sectors, it is not robust to different indicators of financial openness and model specifications. It is possible that some of our financial openness indicators are inappropriate for measuring banking sector openness.

The remainder of the paper is as follows. Section 2 reviews the related literature. Section 3 provides an introduction to our data and measures (indicators) of financial openness and financial development, a brief description of our data and aggregate index measures is included. Section 4 discusses our empirical models and estimation procedures. Section 5 discusses our test results in details. Section 6 summarises our findings.

2. Related Literature

In the development literature, financial liberalization often refers to domestic financial liberalization, which includes banking sector reforms, and even privatizations. McKinnon (1973) and Shaw (1973) study the effects of financial liberalization on interest rates and growth, and liberalization refers to the removal of domestic financial repression on banking sector, for instance, interest rates. Beim and Calomiris (2001) define financial liberalization as some combination of the following six kinds of constraints relaxation, mainly concern the banking system: elimination of interest rate controls; lowering of bank reserve requirements; reduction of government interference in banks' lending decisions; privatization of nationalized banks, introduction of foreign bank competition, facilitation and encouragement of capital inflows.

Many recent studies refer to financial openness as the major form of financial liberalization. The other form of financial liberalization, the so called domestic bank liberalization involving the removal of government repression on domestic banks, is often referred to as financial development. Bekaert (1995) define financial liberalization as the lowering of foreign investment barriers. Bekaert and Harvey (2000) define financial liberalization as allowing inward and outward foreign equity investment. Henry (2003) argues that strictly speaking, equity market liberalization is a specific type of capital account liberalization, which is the decision to allow capital in all forms to move freely in and out of the domestic market. There are other forms of financial openness relating to bond market, banking sector and foreign exchange reforms. The International Monetary Fund (IMF) capital account openness measure combines all of these together in a zero/one variable. The data are from the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions *(*AREAER). Quinn (1997) has recently compiled a composite measure of financial regulation that ranges from 0 to 14, with 14 representing the least regulated and most open regime. The bulk of the index is based upon Quinn's coding of the qualitative information contained in the various issues of AREAER. Chinn and Ito (2002) create and utilize a new index based on the IMF measures of exchange restrictions that incorporates a measure of the intensity of capital controls. Edison and Warnock (2001) present a readily available monthly measure of the intensity of capital controls and also equity

market liberalization across 29 emerging market countries that is based on the degree of restrictions on foreign ownership of equities. Here the degree of stock market liberalization equals the market capitalization of country i's IFC Investible Index divided by the market capitalization of it's IFC Global Index, $MCIFCI_{it} / MCIFCG_{it}$. This is based on data from Standard & Poor's Emerging Markets Database (EMDB).

Many researchers attempt to date financial liberalization (typically stock market liberalization), and treat liberalization as one-off event, and adopt an event study approach to examine the effects of liberalization on equity market. However, defining the liberalization date is difficult. The liberalization process is gradual and extremely complex, capital controls may not have been effective, indirect access may already exist through ADR listing or country fund, official liberalization may not be credible, and other factors may segment the market, such as investment barriers. Henry (2000) define liberalization dates as the first month with a verifiable occurrence of any of the following: liberalization by policy decree, establishment of the first country fund, or an increase in the investibility index $MCIFCI_{it} / MCIFCG_{it}$ of Edison, Warnock (2001) of at least 10 percent. Bekaert and Harvey (2000) define liberalizations as the first of the following dates: official regulatory changes, the introduction of depositary receipts and country funds, and structural breaks in equity capital flows to the emerging markets. Bekaert, Harvey, Lumsdaine (2002) offer an improved approach that results in market liberalization dates, with confidence intervals, for 20 countries. Their methodology exploits the new technique of Bai et al. (1998) to find endogenous break points for the VAR parameters.

Similar to dating liberalization, Kaminsky and Schmukler (2002) construct a new comprehensive chronology of financial liberalization in 28 countries for the period January 1973-June 1999. It captures various aspects of liberalization, namely the deregulation of the capital account, the domestic financial sector, and the stock market. For each sector, the chronology identifies three regimes: "fully liberalized," "partially liberalized," and "repressed." A country is considered to be fully liberalized when at least two sectors are fully liberalized and the third one is partially liberalized. A country is classified as partially liberalized when at least two sectors are partially liberalized.

Typically, in the event study approach, the authors perform panel regressions of dependent variables (for instance, GDP growth rate and cost of capital) on a liberalization dummy and some continuous control variable proxy for other economic reforms. Stock market liberalization is part of a general process that involves substantial macroeconomic reforms such as inflation stabilization and trade liberalization. Henry (2003) argues that the asymmetric treatment (dummy versus continuous variables) of the economic reforms potentially makes empirical conclusions unreliable.

The literature examining the link between financial liberalization and financial development is fairly small compared with the large body of work investigating the link between finance and growth [for example, Levine (1991); King and Levine (1993); Levine and Zervos (1996, 1998); Levine et al. (2000); Demirgüç-Kunt and Maksimovic (1996); and Rajan and Zingales (2001)]; Bekaert, Harvey, Lumsdaine (2002, 2003)]. De Gregorio (1998) examines the related question of whether economies exhibiting greater financial integration experience greater financial development. Instead of relying upon financial restrictions of a regulatory nature, he investigates the effect of lack of financial integration characterized by deviations from the international arbitrage pricing model (IAPM) of Levine and Zervos (1995) and the international capital asset pricing model (ICAPM) of Levine and Zervos (1998). Claessens, Demirgüç-Kunt and Huizinga (1998) present evidence that opening banking markets improves the functioning of national banking systems and the quality of financial services, with positive implications for banking customers and lower profitability of domestic banks. Laeven (2000) examines whether the liberalisation of the banking sector may help reduce financial restrictions and the external cost of capital premium, thus stimulating investment and financial development.

Klein and Olivei (2001) examine a cross-section of 87 industrialized and less developed countries over the 1976-1995 periods. Their measures of financial development include the ratio of liquid liabilities to GDP, the proportion of financial intermediates' claims on the private sector to GDP, and the ratio of private bank to private plus central bank assets. For financial openness, Klein and Olivei use the most common measure of capital account liberalization– the IMF's indicator variable on

capital account restrictions from the Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER). Klein and Olivei find a positive relationship between capital account liberalization and financial development. However, one marked and notable aspect of their results is that the identified correlation is driven entirely by the developed countries in their sample. In other words, there is no detectable relationship between liberalization and development for the less developed countries. Klein and Olivei conjecture that this result obtains because the less developed countries were latecomers to the liberalization game; hence it may merely be the case that the effects of liberalization have not yet been felt, and time will tell.

More recently, Chinn and Ito (2002) create and utilize a new index that incorporates a measure of the intensity of capital controls, based on the IMF measures. They examine the empirical relationship between capital controls and the financial development of credit and equity markets. A substantially broader set of proxy measures of financial development are investigated. The results suggest that the rate of financial development, as measured by private credit creation and stock market activity, is linked to the existence of capital controls. However, the strength of this relationship varies with the empirical measure used, and the level of development. These results also suggest that only in an environment characterized by a combination of a higher level of legal and institutional development will the link between financial openness and financial development be readily detectable. A disaggregated analysis indicates that in emerging markets the most important components of these legal factors are the levels of shareholder protection and of accounting standards.

Chinn and Ito (2005) extend this work focusing on the links between capital account liberalization, legal and institutional development, and financial development, especially that in equity markets. In a panel data analysis encompassing 108 countries and twenty years ranging from 1980 to 2000, they explore several dimensions of the financial sector. The empirical results suggest that a higher level of financial openness contributes to the development of equity markets only if a threshold level of general legal systems and institutions is attained. Among emerging market countries, a higher level of bureaucratic quality and law and order, as well the lower levels of corruption, increases the effect of financial openness on the development of equity markets. In examining the issue of the sequencing, they find that trade openness is

found to be a precondition for capital account liberalization. The findings also indicate that the development in the banking sector is a precondition for equity market development, and that the developments in these two types of financial markets have synergistic effects.

The difficulties of measuring the degree financial openness and financial development have been challenging research works in this area. First, capital account openness measures or index measures of financial liberalization are usually a scoring system that is in part subjective. Second, financial openness and financial development exits in all areas of the financial system, proper measures that incorporate different dimensions of the financial system are needed. And third, given the relative importance of foreign direct investment compared with portfolio investment in many emerging economies such as China and India, the importance of foreign direct investment needs to be taken into account. One of the main contributions of this paper this that our measures of financial openness and financial development are not subjective scores assigned based on qualitative information. We develop index measures that aggregate groups of indicators based on principal component analysis, and in this way our index measures are determined by the inner relationship of actual financial and economic variables.

3. Measures of Financial Openness and Financial Development

We discuss individual indicators of financial openness and financial development, and then construct aggregate index measures with different groups of individual indicators. An introduction of relevant databases is provided in appendix 1.

Individual Measures

Indicators (Measures) of Financial Openness[2]

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[2] Ideally, foreign vs. domestic ownership can be suitable banking system openness indicator, however data are only available for a small number of emerging economies and limited period.

Openness of stock market is measured with: 1. Market capitalization of IFC Investible index to IFC Global index; 2. Number of firms in IFC Investible index to IFC Global index. Data obtained from Standard & Poor's Emerging Markets Data Base (EMDB), monthly available. The first foreign investibility ratio computed with market capitalization is developed by Edison, Warnock (2001), and is widely used in the stock market liberalization literature as proxy variable.

Openness to foreign direct investment is measured with *Gross foreign direct investment to GDP*. Data obtained from World Bank online database, available annually. Gross foreign direct investment is the sum of the absolute values of inflows and outflows of foreign direct investment recorded in the balance of payments financial account. It includes equity capital, reinvestment of earnings, other long-term capital, and short-term capital. This indicator differs from the standard measure of foreign direct investment, which captures only inward investment. The indicator is calculated as a ratio to GDP in U.S. dollars.

The fourth openness measure, related to control of capital flows, is *Gross private capital flows to GDP*. Data obtained from World Bank online database, available annually. Gross private capital flows are the sum of the absolute values of direct, portfolio, and other investment inflows and outflows recorded in the balance of payments financial account, excluding changes in the assets and liabilities of monetary authorities and general government. The indicator is calculated as a ratio to GDP in U.S. dollars.

Indicators (Measures) of Financial Development

Banking system development indicators:

Private Credit by Deposit Money Banks and Other Financial Institutions to GDP: equals claims on the private sector by deposit money banks and other non-bank financial institutions divided by GDP, available from financial development and structure database, reported annually. This measure isolates credit issued to the private sector as opposed to credit issued to governments and public enterprises. Furthermore,

it concentrates on credit issued by intermediaries other than the central bank. It is a measure of the intensity of government interference in bank lending decisions.

Deposit Money vs. Central Bank Assets: measures the size of deposit money banks relative to central banks, reflects the importance of private lending compared with government lending. Data is available from financial development and structure database, reported annually. This measure equals the ratio of deposit money banks assets and the sum of deposit money and central bank assets. Deposit money bank comprises all financial institutions that have liabilities in the form of deposits transferable by check or otherwise usable in making payments.

Total Bank Assets to GDP: a standard measure of financial depth, computed based on data from financial development and structure database, annual frequency.

Liquid liabilities to GDP: a measure of the absolute size of the banking sector based on liabilities, it equals currency plus demand and interest-bearing liabilities of banks and other financial intermediaries divided by GDP. This is the broadest available indicator of financial intermediations, since it includes all financial sectors. It is a typical measure of financial "depth" and thus of the overall size of the financial sector.

Stock market development indicators:

As an indicator of the size of the stock market, we use the *stock market capitalization to GDP* ratio which equals the value of listed shares divided by GDP. To measure the activity or liquidity of the stock markets, we use *stock market total value traded to GDP*, which is defined as total shares traded on the stock market exchange divided by GDP. We use the *stock market turnover ratio* as an efficiency indicator of stock markets, it is defined as the ratio of the value of total shares traded and market capitalization. It measures the activity or liquidity of a stock market relative to its size. A small but active stock market will have a high turnover ratio whereas a large, while less liquid stock market will have a low turnover ratio. Data is reported annually on financial development and structure database.

Table 1 summarizes our financial openness and financial development indicators. Panel A and C report descriptive statistics of our indicators. Pairwise correlation coefficients of our financial openness indicators are reported in panel B, as expected our openness indicators are positively correlated, and the highest two correlations are correlation between the two types of stock market investibility ratios and correlation between foreign direct investment and private capital flows. Pairwise correlation coefficients of our financial development indicators are reported in panel D. Related literature generally suggest that all our financial development indicators should be positively related to the degree of financial development, and that we may expect the pairwise correlations to be positive.

Aggregate Index Measures

We apply principal component analysis (PCA) in order to aggregate information contained in groups of financial openness and financial development indicators. Our index measures are not subjective measures produced by a scoring system. Principal component analysis is usually used as a variable reduction method, or to detect structure in the relationships between variables. The information on a group of variables is then summarized by a number of principal components that are mutually independent. Formally, this is defined by a vector of weights $\alpha = (\alpha_1, \alpha_2, ..., \alpha_N)$ on the (standardized) indicators $X = (X_1, X_2, ..., X_N)'$ such that αX has the maximum variance for any possible combination of weights, subject to the constraint that $\alpha \alpha' = 1$.

In this study, we use only the first principal component as the aggregate index measure of financial openness or financial development. We score the first principal component of four individual indicators of openness described above, and define it as the index measure of financial openness (*FO*). With the two types of stock market investibility ratios we also score a stock market openness index (*SMO*). Similarly, the index measure of financial development (*FD*) is the first principal component of all individual measures of development. I also score similar index measures for the banking sector and stock market development, namely *BD* and *SMD*. Results of principal components analysis are reported in table 2.

In order to score the first principal component, all individual measures need to be available. The sample obtained on financial openness indices is smaller than development indices due to short history of emerging stock markets, annual frequency and missing data. On average the first principal component captures 55% - 75% of the total variation of individual measures. FO captures 53% of the total variation of 4 individual indicators of financial openness; FD captures 56% of the total variation of 7 individual indicators of financial development. The stock market openness index (SMO) captures 75% of the total variations of the two foreign investibility ratios. When performing principal component analysis on only two variables, the first principal component is the average of the two variables after being standardized. Similarly, bank development index (BD) and stock market development index (SMD) captures 67% and 74% of the total variations of individual indicators.

Eigenvectors of the first principal component are also reported in table 2, which are the weights on individual standardized measures when scoring the first principal component. The signs of eigenvectors further convince us of the positive relationships between individual indicators and the latent variables (financial openness or financial development). We observe that the four individual measures of financial openness are all positively associated with the first principal index financial openness (*FO*). Data also suggest financial development is associated with higher private credit and more competition; size and liquidity of both banking sector and stock market increase. Constructing index measures of financial openness and development has yielded sensible results. These eigenvectors also suggest that the loading or weighting of each individual measure when extracting the first principal component are similar, and that they all related to the latent variable financial openness or development. Given most of the correlation coefficients are around 0.4, using any single measure to study financial openness or development potentially causes bias due to measurement error.

Other principal components are not used for 2 reasons. First, we do not find a clear structure, the loading of each variable on the first principal component are in general close. In other words, the correlations between each variable with the latent variable, financial openness or financial development, are similar. This implies that each individual measure reflects the same factor to a similar degree. Second, it is unclear what other components underline (or what other latent variables are) especially when

the methodology assumes components are independent of each other, and inconsistencies will arise when these components actually capture information other than overall degree of financial openness or financial development.

The strength of constructing index measures using principal component analysis is that the index weights on individual measures are produced automatically depending on the inner correlations of individual measures. The weakness of such methods comes from the nature of data on emerging economies. As discussed, in order to produce the first principal component, all individual measures need to be available. Due to the large number of missing values for many of the individual measures, the number of observations in principal component analysis may be much less than the average observations of individual measures. Hence the sample of first principal component values produced for further empirical analysis is also small, this potentially causes sampling biases. Our results suggest this is particularly problematic for our financial openness index (*FO*). We suggest an alternative approach to deal with the problem --- averaging all available standardized indicators of financial openness. This creates our equally weighted financial openness measure *EFO*. Observation obtained with this method is doubled compared with first principal component indices. The main problems of *EFO* index is that if data availability from different countries is very different, such index measures may potentially measure different things. But at least two facts from principal component analysis support this method. First, the signs of eigenvectors on the first principal component, or the correlation between individual indicators and the first principal component justify the signs in the averaging. Second, the values of eigenvectors are in general close, justifying equal weightings. We include equally weighted index measures in our study also for the purpose of testing robustness of results.

Panel C of table 2 reports pairwise correlations of financial openness and financial development indices produced with principal component analysis or equal weightings. The equally weighted financial openness index (EFO) and first principal component index (FO) are almost perfectly correlated. Both Bank development index (BD) and stock market development index (SMD) are highly and positively correlated (0.92, 0.86) with overall development of financial system (FD). Bank development (BD) and stock market development (SMD) are positively correlated with correlation equals to

0.59. Financial openness indices are all positively correlated with financial development indices as we have expected, although the correlations are generally much smaller and around 0.20.

Control Variables

We include the following variables as controls in our regression models:

Country Risk, this is measured by the natural log value of International Country Risk Guide's (ICRG) country risk composite score. The International Country Risk Guide (ICRG) rating comprises 22 risk components in three subcategories of risk: political, financial, and economic. The composite scores, ranging from zero to 100, higher scores are associated with lower risks. Annual Data is available from World Bank online database. Appendix 2 provides 22 risk components in the ICRG system.

We use ICRG composite score as an aggregate control variable for institutional, legal, policy, and economic factors that may determine financial development. Empirical research on potential determinants of financial development has been considerable. A number of ICRG risk components are themselves considered important determinants of financial development, for instance, government stability, corruption, law and order, bureaucracy quality, democratic accountability, exchange rate stability, and inflation rate. La Porta et al. (1997, 1998) have made a significant contribution to this topic concerning the legal determinants of financial development. Mayer and Sussman (2001) emphasize that regulations concerning information disclosure, accounting standards, permissible practice of banks and deposit insurance do appear to have material effects on financial development. Beck et al. (2003) address how institutions are important for financial development. Rajan and Zingales (2003)'s interest groups theory argues that politics matter for financial development. Huybens and Smith (1999) theoretically and Boyd, Levine and Smith (2001) empirically investigate the effects of inflation on financial development.

Trade openness, measured by import plus export as percentage of GDP, annual data obtained from World Bank online database. Some recent work has supported the view that openness to external trade tend to boost financial development (Do and

Levchenko, 2004; Huang and Temple, 2005). *GDP Growth rate* and *GDP per capita* (constant 2000 US$), available form World Bank, GDP growth rate and natural logarithm of real per capita GDP are used as control variables for demand of finance, as in Rajan and Zingales (2003).

4. Panel Data Models and Methods

Static Panel Data Models

Our standard static specification is

$$DEV_{it} = \alpha_i + \beta FO_{it} + \sum_{j=1}^{k} \lambda_j Control_{jit} + \delta t + \xi_{it}, \text{ t} = 1, 2 \dots \text{T.} \qquad (4.1)$$

- DEV_{it}: financial development index measures;

- FO_{it}: financial openness measures (individual indicator or indices);

- $Control_j$ is the group of control, including:

    1. $Trade_{it}$: (Import + Export)/GDP;

    2. $ICRG_{it}$: Natural Logarithms of International Country Risk Guide's (ICRG) country risk composite score;

    3. $GDPG_{it}$: GDP growth rate;

    4. $PCGDP_{it}$: Natural Logarithms of real per capita GDP;

- $t = 1, 2 \dots$ T, it controls for time trend in variables.

α_i captures country effects, control for unobserved heterogeneity, it is different across countries and fixed through time; the coefficient β captures the effects of financial openness on development; $Control_j$ is the group of control variables which include $Trade_{it}$, $ICRG_{it}$, $GDPG_{it}$, $PCGDP_{it}$. The index i refers to the unit of observation (emerging market), t refers to the time period. ξ_{it} is a disturbance term assumed to satisfy the Gauss–Markov conditions. A trend term t has been introduced to allow for

a shift of the intercept over time. t: control for the time trend in variables. For simplicity, we assume constant rate of change for all time periods and all countries.

The main approaches used to deal with (eliminate) unobserved heterogeneity in our study is the within-group fixed effects estimator and first differencing. In the first version, the mean values of the variables in the observations on a given country are calculated and subtracted from the data for that country. In view of (4.1), we obtain:

$$DEV_{it} - \overline{DEV}_{it} = \beta(FO_{it} - \overline{FO}_{it}) + \sum_{j=1}^{k} \lambda_j(Control_{jit} - \overline{Control}_{jit}) + \delta(t - \bar{t}) + \xi_{it} - \overline{\xi}_{it} \quad (4.2)$$

and the unobserved effect disappears. This within group estimator assumes explanatory variables are correlated with unobserved group effects α_i, and for this estimator to be unbiased, explanatory variables needs to be uncorrelated with ξ_{it} in all periods, or strictly exogenous.

In a second version, the first-differences regression model, the unobserved effect is eliminated by subtracting the observation for the previous time period from the observation for the current time period, for all time periods, and we obtain:

$$\Delta DEV_{it} = \beta\Delta FO_{it} + \sum_{j=1}^{k} \lambda_j \Delta Control_{jit} + \delta + \Delta\xi_{it} \quad (4.3)$$

and again the unobserved heterogeneity has disappeared. OLS is unbiased if the first difference of explanatory variable and $\Delta\xi_{it}$ is uncorrelated at time t, this is a weaker assumption than strict exogeneity assumption of fixed effects estimator. Serial correlation arises because of first differencing ($E(\Delta\xi_{it}\Delta\xi_{it-1}) \neq 0$). We report robust standard error in our results.

Dynamic Panel Data Models

We include lagged dependent variable DEV_{it} in the right hand side of the equation

$$DEV_{it} = \alpha_i + \sum_{s=1}^{n} \theta_s DEV_{it-s} + \beta FO_{it} + \sum_{j=1}^{k} \lambda_j Control_{jit} + \delta t + \xi_{it} \quad (4.4)$$

Adding dynamics to a model in this fashion is a major change in the interpretation of the equation. β represents the short run effect of financial openness on financial development, any measured influence of financial openness is conditioned on the history controlled with the lagged dependent variable. In this case, any impact of the explanatory variable represents the effect of new information. The lagged dependent variable is correlated with the disturbance, the within-group estimator applied to a dynamic model is biased, this is referred to as Nickell bias, the size of the bias declines as T increases. We apply the Arellano-Bond (1991) Dynamic Panel Data Model approach with GMM Estimators (DIF-GMM). If we first difference (4.4) we get:

$$\Delta DEV_{it} = \sum_{s=1}^{n} \theta_s \Delta DEV_{it-s} + \beta \Delta FO_{it} + \sum_{j=1}^{k} \lambda_j \Delta Control_{jit} + \delta + \Delta \xi_{it} \qquad (4.5)$$

We have removed group effects and time trend. The transformed error term $\Delta \xi_{it} = \xi_{it} - \xi_{it-1}$ is correlated with $\Delta DEV_{it-1} = DEV_{it} - DEV_{it-1}$ because the first expression implies DEV_{it-1} depends on the error term ξ_{it-1}, and this means we have a statistical endogeneity problem. Although the first-differenced errors are correlated with the first difference of the lagged dependent variable, they may be uncorrelated with lagged levels of the dependent variable dated t-2 and earlier. The lagged levels may be used as instruments for the first difference of the lagged dependent variable. This suggests the use of a GMM estimator, using moment conditions of the following form:

$$E\left[DEV_{it-s} \Delta \xi_{it}\right] = 0 \text{ for } s \geq 2 \qquad (4.6)$$

We allow maximum of 2 or 4 lags of levels to be used as instruments. This can help to avoid the overfitting biases that are sometimes associated with using all the available (linear) moment conditions. If we want to allow for the possibility that ΔFO_{it} and $\Delta Control_{jit}$ are not strictly exogenous, we can again instrument using lagged levels with the similar moment conditions.

Two key tests are serial correlation test derived by Arellano and Bond (1991) and Sargan test of the over-identifying restriction. The null hypothesis assumes no serial

correlation in ξ_{it}. Arellano and Bond (1991) introduce tests for serial correlation, often labelled "m1" for first-order and "m2" for second-order serial correlation. We expect to find first-order serial correlation in the first differenced residuals because $\Delta\xi_{it} = \xi_{it} - \xi_{it-1}$ and $\Delta\xi_{it-1} = \xi_{it-1} - \xi_{it-2}$ both contain ξ_{it-1}. The key problem arises if there is second or higher order serial correlation, as this would suggest that some of the moment conditions are invalid. We also use a Sargan-type test (also known in the GMM context as Hansen's J test) to assess the model specification and over-identifying restrictions, whether the instruments, as a group, appear exogenous.

5. Empirical Results

We discuss panel data regression results in this section. All variables in our regression models except time are standardized so that slope coefficients on different explanatory variables are comparable. Our financial development measures in empirical results are the first principal component index measures *FD* (financial system development), *BD* (banking development), and *SMD* (stock market development) introduced in the last section. In order to examine the effects of financial openness on financial development, empirical tests are first carried out with individual indicators of financial openness, with our results reported in table 3 to 6. We then look at aggregate measures of financial openness *FO* (financial openness index), *EFO* (equally weighted financial openness index), and *SMO* (stock market openness index) described in the last section, test results are in table 7, 8, and 9. Three types of estimators are involved in our empirical work: fixed-effects estimator with levels and OLS estimator with first differenced variables in static models, and Arellano-Bond DIF-GMM estimator in dynamic models. Our results generally suggest financial openness is a significant and important determinant of financial development. When isolating banking sector and stock market development effects, our findings are robust for stock market development throughout different estimators and financial openness measures. The effects on banking sector development do not appear to be robust, although in most cases we obtain the expected positive signs. This may suggest some of our openness measures are inappropriate for banking sector, rather than the absence of the link between financial openness and bank development. We now discuss our results in details.

Individual Indicators of Financial Openness

Table 3 presents our results with stock market investibility ratio, market capitalization of IFC investible index to global index, as indicator of financial openness, estimates of slope coefficients on standardized explanatory variables are reported together with t-statistics in brackets. Our t-statistics are based on robust standard errors. Fixed-effects estimators are reported in the first 3 columns. P-value associated with group effects tests in all 3 regression models are zero, suggesting significant heterogeneity among our sample countries, this implies pooled OLS estimator will be biased and inappropriate. Twenty four countries are covered in our regressions and on average over a 12-year period. The observed slope coefficients and their t-statistics suggest financial openness (stock market investibility ratio, calculated as market capitalizations of IFC investible index divided by IFC global index) is significant determinant of overall financial system development (*FD*) and stock market development (*SMD*), but not for bank development index (*BD*). Financial openness appears to be the second most influential factor that determines financial development after real per capita GDP, and as important as trade openness. Since variables are standardized, slope coefficients (partial effects) of financial openness on *FD* and *SMD* may be interpreted as follows: a unit standard deviation increase of financial openness corresponds to 0.125 standard deviation increase of financial system development (*FD*) and 0.201 standard deviation increase of stock market development (*SMD*). Both positive effects are 1% significant. Results of Pool OLS estimators with first differenced variables are then reported in column 4 to 6. Basic implications may be interpreted similarly as the previous three columns, and our model captures around 20% of variations in financial development (R-squired equals to 0.238 and 0.197).

Column 7, 8, and 9 of table 3 report test results of Arellano-Bond dynamic panel data model with the DIF-GMM estimator. Estimates of slope coefficient now represent gradual adjustments of financial development to new information about explanatory variables, after controlling for lagged dependent variables in the right hand size of our models. The financial openness effects are positive and significant on both banking sector measure (*BD*) and stock market (*SMD*), with slopes equal to 0.051 and 0.087. In column 7, the impact of financial openness on financial system development (*FD*) remains positive however it is only 10% significant. Sargan test p-values basically

suggest our instruments as a group are exogenous. The null hypothesis of serial correlation tests assumes no serial correlation. First order serial correlations (m1) are expected because of first differencing, p-values obtained suggest no significant second order serial correlation (m2).

Our control variables generally have significant impact on financial development indices FD (financial system development), BD (bank development), and SMD (stock market development), although throughout all our tables their impact are sometimes not robust to all model specifications and estimation methods, and inconsistencies exist. Yet still our results may suggest their role in determining cross country differences of financial development, and our findings are in general consistent with the literature. Our models suggest real per capita GDP is a significant and the most important determinant of financial development, its impact is positive and strongest in most cases when comparing across slope coefficients on explanatory variables. Trade openness (import plus export as percentage of GDP) and ICRG country risk rating (proxy for institutions, higher rating means lower risk) appear in most cases to be significant, and their slope coefficients are usually positive when significant. A few exceptions where we have negative signs are the regressions involving bank development (*BD*) as dependent variable. It is possible that the inconsistency is caused by specification problems in our models if some of our financial openness indicators are inappropriate for banking sector. This becomes more obvious for the other control variable GDP growth rate, and the sign of its slope is always negative when the dependent variable is *BD*. It is however unlikely that those countries in our sample with higher growth of GDP have less developed banking sector, after we have already controlled for their real per capita GDP in the models.

Table 4 reports empirical results with the second stock market investibility ratio, number of stocks in IFC investible index to global index, as measure of financial openness. The positive link between financial openness and financial development is strong and highly significant in all nine regressions, including when regressed against bank development (*BD*). Static models with fixed-effects estimator or Pooled OLS estimator using first differenced variables yield similar slope coefficients on the financial openness measure. One standard deviation increase of our stock investibility ratio corresponds to 0.23 or 0.35 standard deviation increase of *FD*, 0.14 or 0.15

standard deviation increase of *BD*, and 0.21 or 0.25 standard deviation increase of *SMD*. The short run impact of financial openness on financial development in our dynamic model with DIF-GMM estimator is reported in the last 3 columns of table 4. The positive impact (0.098, 0.092, and 0.127) is consistent with results in previous columns with static models, and robust against different financial development measures *FD*, *BD*, and *SMD*. Sargan tests and tests of serial correlation do not identify serious problems with the group of instruments used.

The regressions in table 5 use our third indicator of financial openness, gross foreign direct investment as percentage of GDP. The results generally suggest a positive relationship between this indicator and financial development, however they appear to be statistically insignificant. The absence of any statistically significant link between direct investment and financial development may reflect the fact that although direct investment represent huge portion of cross border capital flows, this type of foreign capital is usually tied to particular enterprises or projects, and unlikely to enter emerging financial markets through either banks or stock markets, providing a source of finance that may be accessed by any firms. Therefore, direct investment has insignificant impact on size or efficiency of financial systems.

Our fourth indicator of financial openness is also related to capital flows, and it is gross private capital flows as percentage of GDP. Regression results with this fourth financial openness measures are reported in table 6. Gross private capital flows are the sum of the absolute values of direct, portfolio, and other investment inflows and outflows recorded in the balance of payments financial account. Although this indicator still involves direct investment, again we find statistically significant and positive links between financial openness and financial system development (*FD*) and stock market development (*SMD*), however not for bank development (*BD*). Comparing across slope coefficients on explanatory variables, we found our fourth indicator of financial openness having relatively strong influence on stock market development than on the entire financial system. The significance may reflect that cross border portfolio investment in stock markets has promoted development of local stock markets of emerging economies, through increasing stock market capitalization, and more active trading activities responding to efficient and timely information, not only local but more and more importantly global.

Index Measures of Financial Openness

The first aggregate index measure of financial openness we look at is the first principal component of the four individual indicators, namely *FO*. In order to examine the link between financial openness and financial development, similar model specifications and estimation methods are applied, and regression results are reported in table 7. Again, the p-value associated with the tests of group effects shows highly significant heterogeneity among our sample emerging economies. Number of groups (countries) included in table 7 regressions is limited to 16 and 18 due to the method of aggregating four openness indicators with principal component analysis. Columns 1 to 6 of this table are static model results, with fixed effects estimates and first differenced Pooled OLS estimates. As in previous tables with individual financial openness indicators, impact of financial openness index *FO* on financial system development (*FD*) and stock market development (*SMD*) is positive and highly significant. We may also notice that the size of the impact, or the slope coefficients on *FO,* differs substantially, this however is probably due to different estimation methods. Comparing slopes on explanatory variables and in different columns, *FO* appears more influential to *FD* and *SMD* with first differenced OLS estimator than with fixed effects estimator. Our model captures around 24% of the variation in *FD* and 22% in *SMD*. We do not find significant impact on bank development index (*BD*), and this is consistent with static model results with 3 out of 4 individual financial openness indicators. This also indicates that our financial openness indicators are more appropriate for stock market and at least some of them maybe inappropriate for banking sector. Measures like foreign ownership of bank assets or number of foreign banks may be much better proxies for banking sector openness, however we do not have such data for a large number of emerging economies.

Dynamic model with DIF-GMM estimator results are reported in the last 3 columns of table 7. The short run impact, which represents gradual adjustments, of *FO* on financial development indices *FD* (0.055) and *SMD* (0.201) are positive and significant. In all our tables, maximum of 2 or 4 lagged levels are used as instruments for first differenced dependent variable and predetermined variables. Sargan tests and serial correlation tests of column 7 and 9 do not suggest any problem with the group of instruments we specified. Although in column 8 financial openness (*FO)* has a

significant and positive effect on bank development (*BD*), sargan test and second order serial correlation test suggest the group of instruments may be invalid.

Empirical results with equally weighted financial openness index (*EFO*) are reported in table 8. Heterogeneity still appears to be significant. The number of groups substantially increased and observations almost double those of table 7, due to averaging available standardized individual indicators of financial openness to create *EFO*. Slope coefficients on *EFO* are not very different from the ones on *FO* in table 7, and again with static models in columns 1 to 6 we have positive and significant slopes on *EFO* against financial development indices *FD* and *SMD*, but not *BD*. Around 20% of the variance of *FD* and *SMD* are explained by our models. In the last 3 columns of table 8, *EFO* has highly significant and positive impact on all three financial development indices *FD*, *BD*, and *SMD* with dynamic specification and DIF-GMM estimators. The coefficient (measuring short run impact) on stock market (0.141) seems stronger than on banking sector (0.073).

Our third aggregate measure of financial openness *SMO* (stock market openness) focus on the stock market only, and the first principal component of two investibility ratio is effectively the average of them after being standardized. Regression results using *SMO* are reported in table 9. Impact of SMO on financial development indices FD and SMD are roughly the same in columns 1 to 6 under static model specification, and we have positive and significant slope coefficients. Comparing with slopes on other explanatory variables in our models, the influence of *SMO* is strong if not the strongest. When regressed against bank development (*BD*), our results in column 2 and 5 are not robust to the two types of estimation methods. The fixed effects estimate 0.080 is significant in column 2, but much smaller than the impact against *FD* and *SMD* in column 1 and 3. Column 5 slope on *SMO* is still positive, however insignificant, and R-squared of this regression is only 12.3%. With dynamic models and DIF-GMM estimators, our results in the last three columns of table 9 suggest that the short run impact on three types of financial development indices FD, BD, and SMD are almost the same. We have significant slope coefficient of 0.072, 0.091, and 0.078. In other words, conditional on past levels (2 lags) of financial development, level of financial development (*FD*, *BD*, and *SMD*) increase by 0.07 to 0.09 standard deviations in response to one standard deviation increase of stock market openness

(*SMO*) in the same year. Sargan tests and serial correlation tests generally suggest our instruments are exogenous and valid.

6. Conclusion

In this paper, we examine the link between financial openness and financial development in major emerging markets with significant stock market. With a large group of indicators of financial development including banking system and stock market, some sort of aggregate measures are needed to capture the multi-dimensional nature of financial development. Our aggregation method involves a simple application of principal component analysis, and uses the first principal component of a group of financial development indicators as the index measure (*FD*, *BD*, and *SMD*). The similar weights on each individual indicator when scoring first principal components further convince us that using this type of aggregate measure is more appropriate than using a few indicators separately. Financial openness also takes different forms in different areas of emerging market financial systems. Four indicators of financial openness used in this paper are: stock market investibility ratio based on market capitalization or number of stocks of IFC investible index and global index, gross foreign direct investment as percentage of GDP, and gross private capital flows as percentage of GDP. Similar with the group of financial development indicators, we score first principal component of four financial openness indicators as aggregate index measure of financial openness (*FO*). In addition, we also calculate equally weighted financial openness index (*EFO*) by averaging available indicators.

Panel data regressions are carried out first with individual indicators of financial openness against indices of financial development, then with aggregate index measures of financial openness. We control for trade openness, country risk ratings, GDP growth rates, and real per capita GDP in our models. The effect of financial openness, except when measured by gross foreign direct investment as a percentage of GDP, on stock market development appears to be strong and robust under both static and dynamic model specifications. We apply three types of estimation procedures --- fixed effects, first differenced OLS, and DIF-GMM. For banking sector development, we also have some significant findings that financial openness promotes bank

development, however this does not appear to be robust. The overall level of financial development concerning both banking sector and stock market is also significantly affected by financial openness indicators, and it is likely that stock market played an important role in picking up the positive effect. Regressions with aggregate index measures of financial openness yield results consistent with individual indicators, and are possibly driven by stock market investibility ratios in some cases. We realize that at least some of our indicators of financial openness may be inappropriate for measuring banking sector openness, and this might cause measurement error and model specification problem that have affected our results. But "ideal" indicators such as foreign ownership of banks are not available for large group of emerging economies. It is our hope that better indicators of banking sector openness become available in the future, which may allow us to explore these issues in more depth.

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Table 1: Summary of financial openness and development indicators[3]

Panel A: Summary of financial openness indicators

Financial Openness Indicators	Obs	Mean	Std. Dev.	Min	Max
Stock Market Inv. (MC)	355	65.93	29.96	3.11	100
Stock Market Inv. (NUM)	355	62.69	29.25	7.62	100
Gross FDI / GDP	532	0.00	1.24	-4.61	4.02
Gross Private Capital Flows / GDP	557	1.86	0.93	-1.00	4.49

Panel B: Pairwise correlations of financial openness indicators

Pairwise Correlations	Stock Market Inv. (MC)	Stock Market Inv. (NUM)	Gross FDI / GDP	Gross Private Capital Flows / GDP
Stock Market Inv. (MC)	1.00			
Stock Market Inv. (NUM)	0.49	1.00		
Gross FDI / GDP	0.30	0.25	1.00	
Gross Private Capital Flows /GDP	0.21	0.29	0.56	1.00

Stock Market Inv. (MC) is the stock market investibility ratio calculated as market capitalisation of IFC Investible index divided by market capitalization of IFC Global index, for emerging market i at time t, data available from S&P Emerging market Database. *Stock Market Inv. (NUM)* is stock market investibility ratio calculated as number of stocks in IFC Investible index divided by number of stocks in IFC Global index, for emerging market i at time t, data available from S&P Emerging Market Database. *Gross FDI / GDP* is gross foreign direct investment (inflow + outflow) as a percentage of GDP, data obtained from World Bank Online Database. *Gross Private Capital Flows / GDP* is gross private capital flows (inflow + outflow) as a percentage of GDP, data obtained from World Bank Online Database.

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[3] Indicators are collected as percentage values, for example a ratio of 0.25 is collected as 25. Natural logarithms of some variables are taken to reduce the effects of outliers in empirical analysis.

Panel C: Summary of financial development indicators

Financial Development Indicators	Obs	Mean	Std. Dev.	Min	Max
LN(private credit to GDP)	814	4.08	0.70	2.00	5.69
Deposite VS. Central Bank Asset	823	80.80	16.00	16.19	99.97
LN(total bank assets to GDP)	822	3.81	0.63	2.00	5.04
Liquid Liability to GDP	792	45.35	23.27	7.64	100.00
LN(stock market cap. to GDP)	742	2.63	1.40	-2.00	5.64
LN(stock market turnover)	731	3.01	1.43	-2.00	6.27
LN(stock value traded to GDP)	769	1.07	2.11	-4.61	6.47

Panel D: Pairwise correlations of financial development indicators

Pairwise Correlations	LN(private credit/GDP)	Deposite VS. Central Bank Asset	LN(total bank assets/GDP)	Liquid Liability/GDP	LN(stock market cap./GDP)	LN(stock market turnover)
LN(private credit to GDP)	1.00					
Deposite VS. Central Bank Asset	0.49	1.00				
LN(total bank assets to GDP)	0.77	0.07	1.00			
Liquid Liability to GDP	0.75	0.29	0.72	1.00		
LN(stock market cap. to GDP)	0.53	0.40	0.39	0.48	1.00	
LN(stock market turnover)	0.23	0.33	0.19	0.23	0.28	1.00
LN(stock value traded to GDP)	0.51	0.45	0.40	0.44	0.77	0.80

Table 2: Index measures of financial openness and financial development[4]

Panel A: First principal component financial openness indices

Index Measure	Proportion	Stock market Inv. (MC)	Stock Market Inv. (NUM)	Foreign Direct Investment	Private Capital Flows	Obs
Financial Openness (FO)	0.53	0.47	0.48	0.53	0.52	219
Stock Market Openness (SMO)	0.75	0.71	0.71			355

Panel B: First principal component financial development indices

Index Measures	Proportion	Private Credit	Dep. VS. Central Bank	Total Bank Assets	Liquid Liability	Stock Market Cap.	Stock Market turnover	Stock Value Traded	Obs
Financial Development (FD)	0.56	0.45	0.29	0.39	0.39	0.39	0.27	0.43	605
Bank Development (BD)	0.67	0.58	0.28	0.53	0.55				711
Stock Market Development (SMD)	0.74					0.52	0.53	0.67	717

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[4] *Proportion*, the proportion of total variance of the group of variables captured by the first principal component in PCA. The numbers under individual measures (indicators) are eigenvectors of the first principal component, and are basically the weights on each standardized variable when scoring the first principal component.

Panel C: Pairwise correlations of index measures

	FO	EFO	SMO	FD	BD	SMD
FO	1.00					
EFO	0.99	1.00				
SMO	0.79	0.91	1.00			
FD	0.26	0.19	0.08	1.00		
BD	0.20	0.15	0.06	0.92	1.00	
SMD	0.22	0.23	0.22	0.86	0.59	1.00

EFO: equally weighted index of financial openness, it is the average of available individual standardized indicators of financial openness.

Table 3: Financial Openness Indicator 1 and Financial Development

Our standard static model specification with fixed-effects is $DEV_{it} = \alpha_i + \beta FO_{it} + \sum_{j=1}^{k} \lambda_j Control_{jit} + \delta t + \xi_{it}$, t = 1, 2 ... T. (4.1), results are in

column 1-3. α_i capture country fixed effects. DEV_{it} is financial development index measure, including Financial System Development (FD),

Bank Development (BD), and Stock Market Development (SMD). FO_{it} is financial openness measure (individual indicator or aggregate indices).

$Control_j$ is the group of control variables, including: 1) $Trade_{it}$: (Import + Export)/GDP; 2) $ICRG_{it}$: Natural Logarithms of International

Country Risk Guide's (ICRG) country risk composite score; 3) $GDPG_{it}$: GDP growth rate; 4) $PCGDP_{it}$: Natural Logarithms of real per capita

GDP. t = 1, 2 ... T, it is a control for time trend in variables.

First Differencing (4.1), we eliminate country effects α_i and time trend, and have

$$\Delta DEV_{it} = \beta \Delta FO_{it} + \sum_{j=1}^{k} \lambda_j \Delta Control_{jit} + \delta + \Delta \xi_{it} \qquad (4.5), \text{ results are in column 4 -6.}$$

Our dynamic model (DIF-GMM) include lagged dependent variable in the right hand side of the model,

$$DEV_{it} = \alpha_i + \sum_{s=1}^{n} \theta_s DEV_{it-s} + \beta FO_{it} + \sum_{j=1}^{k} \lambda_j Control_{jit} + \delta t + \xi_{it} \qquad (4.6).$$

We first difference it then estimate model parameters with GMM, results are in column 7-9.

	Fixed-effects, level			Pooled OLS, 1st Difference			DIF-GMM		
Table 3: Financial Openness Indicator 1 and Financial Development[5]									
Estimators	Fixed-effects, level			Pooled OLS, 1st Difference			DIF-GMM		
Column Number	1	2	3	4	5	6	7	8	9
Fin. Dev. Index	FD	BD	SMD	FD	BD	SMD	FD	BD	SMD
Financial Openness	**0.125***	**0.031**	**0.201***	**0.136***	**-0.024**	**0.146***	**0.035***	**0.051***	**0.087***
(stock market inv. MC)	**(4.06)**	**(0.93)**	**(4.32)**	**(3.13)**	**(-0.61)**	**(3.12)**	**(1.71)**	**(4.24)**	**(3.12)**
Trade	0.194***	0.146***	0.193***	0.150***	0.040	0.119**	0.010	-0.041*	0.043
	(4.21)	(2.93)	(2.73)	(3.59)	(0.98)	(2.42)	(0.32)	(-1.94)	(0.88)
ICRG (Country Risk)	0.057**	0.056*	0.020	0.228***	0.061	0.206***	0.077***	0.023***	0.112***
	(2.05)	(1.90)	(0.47)	(4.56)	(1.20)	(3.79)	(3.19)	(3.33)	(3.63)
GDP Growth	-0.012	-0.077***	0.072***	0.010	-0.214***	0.215***	-0.007	-0.060***	0.061***
	(-1.01)	(-5.87)	(3.78)	(0.14)	(-3.24)	(3.03)	(-0.95)	(-8.39)	(4.97)
Real Per Capita GDP	1.662***	1.634***	0.951**	0.230***	0.228***	0.096**	0.978***	0.494**	0.059
	(6.54)	(6.01)	(2.42)	(5.02)	(6.63)	(1.98)	(3.10)	(2.00)	(0.09)
t (Year 1,2,3,...)	-0.066***	0.045**	-0.132						
	(-3.93)	(2.10)	(-6.82)						
No. of Obs.	290	290	320	290	290	320	248	253	273
No. of Groups	24	24	26				24	24	26
R-squared				0.238	0.118	0.197			
P-value, group effects F test	0.00	0.00	0.00						
Lags of Dependant Var.							2	2	2
Sargan Test P-value							0.96	0.95	0.74
Serial Corr. (m1) P-value							0.03	0.03	0.17
Serial Corr. (m2) P-value							0.42	0.11	0.15

[5] *** indicate significance at 99% confidence level, ** indicate significance at 95% confidence level, * indicate significance at 90% confidence level. The numbers in brackets are t-statistics. Financial openness in this table is measured with the stock market investibility ratio, *Stock Market Inv. (MC)*, calculated as market capitalisation of IFC Investible index divided by market capitalization of IFC Global index.

Table 4: Financial Openness Indicator 2 and Financial Development									
Estimators	Fixed-effects, level			Pooled OLS, 1st Difference			DIF-GMM		
Column Number	1	2	3	4	5	6	7	8	9
Fin. Dev. Index	FD	BD	SMD	FD	BD	SMD	FD	BD	SMD
Financal Openness[6]	**0.226***	**0.148***	**0.212***	**0.347***	**0.141***	**0.246***	**0.098***	**0.092***	**0.127**
(stock market inv. NUM)	**(7.21)**	**(4.25)**	**(4.54)**	**(7.94)**	**(2.85)**	**(4.67)**	**(3.93)**	**(7.39)**	**(5.19)**
Trade	0.165***	0.121**	0.177***	0.137	0.034	0.114***	0.001	-0.024	0.081**
	(3.78)	(2.46)	(2.50)	(3.92)	(0.83)	(2.50)	(0.03)	(-1.18)	(2.10)
ICRG (Country Risk)	0.038	0.048*	-0.014	0.163***	0.043	0.154***	0.059***	0.013**	0.095***
	(1.46)	(1.68)	(-0.32)	(3.58)	(0.83)	(2.88)	(2.54)	(1.95)	(3.83)
GDP Growth	-0.005	-0.072***	0.078	0.016	-0.210***	0.215***	0.008*	-0.063***	0.053**
	(-0.45)	(-5.65)	(4.11)	(0.26)	(-3.18)	(3.16)	(-1.71)	(-8.32)	(4.93)
Real Per Capita GDP	0.921***	1.104***	0.429	0.179***	0.197***	0.070	0.271	0.766***	-0.141
	(3.48)	(3.78)	(1.03)	(3.97)	(5.59)	(1.34)	(1.02)	(10.07)	(-0.32)
t (Year 1,2,3,...)	-0.036**	0.068***	-0.104***						
	(-2.23)	(3.03)	(-5.62)						
No. of Obs.	290	290	320	290	290	320	248	253	273
No. of Groups	24	24	26				24	24	26
R-squared				0.345	0.146	0.237			
P-value, group effects F test	0.00	0.00	0.00						
Lags of Dependant Var.							2	2	2
Sargan Test P-value							0.92	0.80	0.80
Serial Corr. (m1) P-value							0.09	0.01	0.15
Serial Corr. (m2) P-value							0.16	0.16	0.18

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[6] Financial openness in this table is measured with the stock market investibility ratio, *Stock Market Inv. (NUM),* calculated as number of stocks in IFC Investible index divided by number of stocks in IFC Global index.

Table 5: Financial Openness Indicator 3 and Financial Development									

Estimators	Fixed-effects, level			Pooled OLS, 1st Difference			DIF-GMM		
Column Number	1	2	3	4	5	6	7	8	9
Fin. Dev. Index	FD	BD	SMD	FD	BD	SMD	FD	BD	SMD
Financal Openness[7]	**0.046**	**0.016**	**0.044**	**0.034**	**-0.090**	**0.117**	**0.034**	**0.016**	**0.066**
(Gross FDI / GDP)	**(1.32)**	**(0.44)**	**(0.95)**	**(0.43)**	**(-1.19)**	**(1.62)**	**(1.21)**	**(0.90)**	**(1.52)**
Trade	0.003	-0.175**	0.286***	0.083*	0.016	0.100**	-0.089	-0.051	0.112
	(0.04)	(-2.28)	(2.83)	(1.78)	(0.40)	(2.18)	(-1.24)	(-1.26)	(1.03)
ICRG (Country Risk)	0.102**	-0.028	0.205***	0.183***	-0.024	0.211***	0.075***	-0.038*	0.183***
	(3.10)	(-0.82)	(4.60)	(2.57)	(-0.40)	(3.28)	(2.58)	(-1.88)	(4.30)
GDP Growth	-0.014	-0.061***	0.048**	-0.110	-0.308***	0.208***	0.038*	-0.037**	0.059***
	(-0.85)	(3.61)	(2.21)	(-1.24)	(-4.28)	(2.71)	(1.87)	(-2.36)	(2.14)
Real Per Capita GDP	0.778**	0.225	1.265***	0.288***	0.211***	0.174***	-1.185	0.221	-1.71
	(2.23)	(0.61)	(2.70)	(5.89)	(5.38)	(3.58)	(-1.31)	(0.30)	(-1.28)
t (Year 1,2,3,...)	0.067***	0.137***	-0.040						
	(3.04)	(5.18)	(-1.40)						
No. of Obs.	290	292	331	290	292	331	263	274	305
No. of Groups	16	16	18				16	16	18
R-squared				0.135	0.115	0.173			
P-value, group effects F test	0.00	0.00	0.00						
Lags of Dependant Var.							2	2	2
Sargan Test P-value							1.00	1.00	1.00
Serial Corr. (m1) P-value							0.92	0.81	0.13
Serial Corr. (m2) P-value							0.61	0.70	0.08

[7] Financial openness in this table is measured with gross foreign direct investment (inflow + outflow) as a percentage of GDP, *Gross FDI / GDP*.

Table 6: Financial Openness Indicator 4 and Financial Development									
Estimators	Fixed-effects, level			Pooled OLS, 1st Difference			DIF-GMM		
Column Number	1	2	3	4	5	6	7	8	9
Fin. Dev. Index	FD	BD	SMD	FD	BD	SMD	FD	BD	SMD
Financal Openness[8]	**0.063****	**0.010**	**0.220*****	**0.130****	**-0.022**	**0.145*****	**0.040****	**0.012**	**0.095*****
(Gross Private Capital Flows / GDP)	**(2.27)**	**(0.34)**	**(4.01)**	**(2.38)**	**(-0.39)**	**(3.15)**	**(2.16)**	**(0.83)**	**(2.74)**
Trade	-0.019	-0.178**	0.047	0.061	0.010	0.086**	-0.110	0.013	-0.017
	(-0.26)	(-2.34)	(0.70)	(1.38)	(0.24)	(2.07)	(-0.66)	(0.30)	(-0.22)
ICRG (Country Risk)	0.102***	-0.022	-0.034	0.174***	-0.027	0.206***	0.056**	-0.009	0.143***
	(3.30)	(-0.67)	(-0.61)	(2.48)	(-0.46)	(3.45)	(2.25)	(-0.30)	(3.62)
GDP Growth	-0.017	-0.063***	0.222***	-0.118	-0.299***	0.195***	0.015	-0.080**	0.095**
	(-1.11)	(-3.85)	(5.05)	(-1.37)	(-4.23)	(2.64)	(0.93)	(-2.25)	(2.23)
Real Per Capita GDP	0.820**	0.194	0.997***	0.298***	0.200***	0.193***	-1.107	1.62	-2.084
	(2.42)	(0.54)	(4.40)	(6.32)	(5.22)	(3.91)	(-1.47)	(1.00)	(-1.19)
t (Year 1,2,3,...)	0.068***	0.137***	0.063***						
	(3.19)	(5.21)	(7.24)						
No. of Obs.	298	300	357	298	300	339	271	282	313
No. of Groups	16	16	18				16	16	18
R-squared				0.150	0.107	0.184			
P-value, group effects F test	0.00	0.00	0.00						
Lags of Dependant Var.							2	2	2
Sargan Test P-value							0.84	1.00	0.71
Serial Corr. (m1) P-value							0.58	0.24	0.07
Serial Corr. (m2) P-value							0.84	0.62	0.43

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[8] Financial openness in this table is measured with gross private capital flows (inflow + outflow) as a percentage of GDP, *Gross Private Capital Flows / GDP*.

	Table 7: Financial Openness Index (FO) and Financial Development								
Estimators	Fixed-effects, level			Pooled OLS, 1st Difference			DIF-GMM		
Column Number	1	2	3	4	5	6	7	8	9
Fin. Dev. Index	FD	BD	SMD	FD	BD	SMD	FD	BD	SMD
Financal Openness (FO)[9]	**0.073***	**0.044**	**0.093**	**0.203***	**0.028**	**0.145**	**0.055**	**0.035**	**0.201***
	(2.62)	**(0.92)**	**(2.23)**	**(3.44)**	**(0.52)**	**(2.05)**	**(1.96)**	**(2.41)**	**(3.81)**
Trade	0.244***	0.121**	0.429***	0.088	-0.003	0.104**	0.087	0.132**	0.156*
	(3.45)	(1.98)	(3.88)	(1.58)	(-0.06)	(2.01)	(1.07)	(2.43)	(1.86)
ICRG (Country Risk)	-0.003	-0.077	0.048	0.073	-0.176***	0.234***	0.038	-0.024	0.052
	(-0.08)	(-1.51)	(0.91)	(1.32)	(-3.36)	(3.36)	(1.16)	(-0.79)	(1.36)
GDP Growth	0.008	-0.026	0.083***	0.051	-0.156***	0.214**	0.017	-0.040***	0.089***
	(0.57)	(-0.65)	(3.44)	(0.66)	(-2.52)	(2.32)	(1.27)	(-3.29)	(2.72)
Real Per Capita GDP	2.015***	0.977***	1.85***	0.309***	0.257***	0.170***	-0.400	0.057	-1.000
	(6.25)	(3.88)	(3.60)	(6.29)	(6.45)	(2.92)	(-0.49)	(0.13)	(-0.71)
t (Year 1,2,3,...)	-0.038*	0.030***	-0.121***						
	(-1.85)	(3.14)	(-5.49)						
No. of Obs.	198	214	228	198	198	228	171	171	193
No. of Groups	16	16	18				16	16	18
R-squared				0.237	0.179	0.222			
P-value, group effects F test	0.00	0.00	0.00						
Lags of Dependant Var.							2	2	2
Sargan Test P-value							0.86	1.00	0.70
Serial Corr. (m1) P-value							0.96	0.58	0.22
Serial Corr. (m2) P-value							0.24	0.09	0.18

[9] Financial openness in this table is an aggregate index measure FO, calculated as the first principal component of four individual financial openness measures in table 3 -6.

Table 8: Financial Openness Index (EFO) and Financial Development								
Estimators	Fixed-effects, level			Pooled OLS, 1st Difference			DIF-GMM		
Column Number	1	2	3	4	5	6	7	8	9
Fin. Dev. Index	FD	BD	SMD	FD	BD	SMD	FD	BD	SMD
Financal Openness (EFO)[10]	**0.084*****	**0.048***	**0.103*****	**0.164*****	**0.038**	**0.176*****	**0.120*****	**0.073*****	**0.141*****
	(3.53)	**(1.87)**	**(3.14)**	**(3.12)**	**(0.80)**	**(2.96)**	**(8.24)**	**(17.77)**	**(3.57)**
Trade	0.105**	0.010	0.188***	0.131***	0.039	0.107***	-0.034	-0.015	-0.062
	(2.03)	(0.18)	(2.60)	(3.59)	(1.10)	(2.59)	(-1.29)	(-0.89)	(-1.22)
ICRG (Country Risk)	0.129***	0.046*	0.172***	0.251***	0.113**	0.177***	0.086***	0.032***	0.155***
	(4.84)	(1.65)	(4.68)	(4.59)	(2.24)	(3.60)	(4.43)	(4.01)	(4.71)
GDP Growth	-0.018	-0.071***	0.055***	-0.071	-0.287***	0.219***	-0.018**	-0.072***	0.065***
	(-1.39)	(-5.00)	(3.03)	(-0.98)	(-4.45)	(3.53)	(-2.29)	(-6.65)	(3.23)
Real Per Capita GDP	0.925***	0.736**	0.730*	0.236***	0.195***	0.121***	0.113	1.202**	-1.036
	(3.31)	(2.45)	(1.91)	(5.57)	(5.92)	(2.78)	(0.40)	(2.40)	(-1.40)
t (Year 1,2,3,...)	0.022	0.071***	-0.035*						
	(1.34)	(3.15)	(-1.64)						
No. of Obs.	390	392	431	390	392	431	348	364	393
No. of Groups	24	24	26				24	24	26
R-squared				0.202	0.109	0.180			
P-value, group effects F test	0.00	0.00	0.00						
Lags of Dependant Var.							2	2	2
Sargan Test P-value							0.89	0.97	0.89
Serial Corr. (m1) P-value							0.00	0.03	0.04
Serial Corr. (m2) P-value							0.45	0.20	0.42

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[10] Financial openness in this table is an aggregate index measure EFO, calculated as average of available individual openness measures in table 3 -6.

Table 9: Financial Openness Index (SMO) and Financial Development								
Estimators		Fixed-effects, level			Pooled OLS, 1st Difference			DIF-GMM	
Column Number	1	2	3	4	5	6	7	8	9
Fin. Dev. Index	FD	BD	SMD	FD	BD	SMD	FD	BD	SMD
Financal Openness (SMO)[11]	**0.198*****	**0.080*****	**0.233*****	**0.273*****	**0.064**	**0.221*****	**0.072*****	**0.091*****	**0.078****
	(6.50)	**(2.89)**	**(5.14)**	**(5.81)**	**(1.45)**	**(4.11)**	**(2.82)**	**(7.02)**	**(2.29)**
Trade	0.173***	0.132***	0.175***	0.143***	0.038	0.114***	-0.022	-0.040	-0.094
	(3.91)	(2.66)	(2.50)	(3.78)	(0.92)	(2.47)	(-0.90)	(-1.13)	(0.47)
ICRG (Country Risk)	0.051**	0.056**	0.003	0.207***	0.062	0.183***	0.065***	0.019***	0.119***
	(1.95)	(1.98)	(0.07)	(4.36)	(1.21)	(3.48)	(2.82)	(3.00)	(5.40)
GDP Growth	-0.008	-0.075***	0.075***	0.014	-0.212***	0.215***	-0.009*	-0.059***	0.051***
	(-0.72)	(-5.79)	(4.03)	(0.21)	(-3.21)	(3.11)	(-1.73)	(-9.15)	(5.14)
Real Per Capita GDP	1.235***	1.403***	0.563	0.196***	0.213***	0.077	0.177	0.163	-0.211
	(4.86)	(5.01)	(1.41)	(4.25)	(5.99)	(1.49)	(0.70)	(0.49)	(-0.41)
t (Year 1,2,3,...)	-0.056***	0.054**	-0.120***						
	(-3.31)	(2.42)	(-6.40)						
No. of Obs.	290	290	320	290	290	320	248	253	273
No. of Groups	24	24	26				24	24	26
R-squared				0.300	0.123	0.226			
P-value, group effects F test	0.00	0.00	0.00						
Lags of Dependant Var.							2	2	2
Sargan Test P-value							0.95	0.91	0.76
Serial Corr. (m1) P-value							0.10	0.07	0.15
Serial Corr. (m2) P-value							0.20	0.10	0.21

[11] Financial openness in this table is an aggregate index measure SMO, calculated as the first principal component of the two types of stock market investibility ratios in table 3 and 4.

Appendix 1: Databases

The Emerging Markets Data Base

Stock market data are from Standard & Poor's Emerging Markets Data Base (EMDB). With information collected since 1975, EMDB was the first database to track emerging stock markets. As of January 2003, EMDB tracked 53 stock markets in Asia, Latin America, Eastern Europe, Africa and the Middle East, providing daily, weekly, monthly, quarterly, and yearly data on more than 2,200 stocks by company, industry, country, region, and more. Using a selected sample of stocks in each market, EMDB calculates indices of stock market performance designed to serve as benchmarks consistent across national boundaries. This eliminates the inconsistencies that make it difficult to compare locally-produced Indices with differing methodologies.

When the first S&P Emerging Markets Indices were calculated in the mid-1980s, most developing countries had major restrictions on foreign portfolio investment. The first series of indices, the S&P/IFCG (Global) indices, were designed to accurately reflect the perspective of local investors. They do not take into consideration restrictions on foreign ownership that limit the accessibility of certain markets and individual stocks. Their primary use is to gauge and compare local market sizes and price movements. Since the mid-1980s, barriers to investment have fallen markedly and foreign investment in emerging markets has soared, bringing with it the need for an index that reflects new opportunities for foreign investment. Accordingly, Standard & Poor's also produces the S&P/IFCI (Investible) Index series, which provide a broad, neutral, and historically consistent benchmark for the growing emerging market investment community. Methodologies for calculating the S&P/IFCG and S&P/IFCI indices are similar. The key difference is that investible indices are adjusted to reflect restrictions on foreign investment in emerging markets. S&P/IFCI indices go beyond definitions of legal investibility and has applied minimum market capitalization and liquidity hurdles for the inclusion of individual stocks. In January 1996, S&P began adjusting the capitalization of index constituents to eliminate cross-holdings. The adjustments eliminate distortions caused by double-counting of share capitalization, thereby reducing the weights of stocks and markets where cross-holding is prevalent.

In November 1996, adjustments to eliminate government holdings were introduced. Our sample includes 35 emerging markets with monthly total return indices from 1976 to 2002, most IFC global indices series start from 1985, and investible index series from 1988.

World Bank Online Databases

The World Bank offers multiple databases online. World Development Indicators (WDI) is the premiere data source on the global economy. It contains statistical data for over 550 development indicators and time series data from 1960-2002 for over 200 countries and 18 country groups. Data includes social, economic, financial, natural resources, and environmental indicators. Global Development Finance (GDF) contains statistical data for the 136 countries that report public and publicly-guaranteed debt to the World Bank Debtor Reporting System. The database covers external debt stocks and flows, major economic aggregates, and key debt ratios as well as average terms of new commitments, currency composition of long-term debt, debt restructuring, and scheduled debt service projections.

Financial Development and Structure Database[12]

Previously, financial analysts and researchers have relied on a few indicators of the banking sector and the stock market, using data from the IMF's International Financial Statistics and the IFC's Emerging Market Database. This new database, constructed by Beck, Demirgüç-Kunt, and Levine, draws on a wider array of sources and constructs indicators of the size, activity and efficiency of a much broader set of financial institutions and markets. It improves on previous efforts by presenting data on the public share of commercial banks, by introducing indicators of the size and activity of nonbank financial institutions, and by presenting measures of the size of bond and primary equity markets. The database will thus enable financial analysts and researchers to compare the level of financial development and the structure of the financial sector of a specific country with that of other countries.

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[12] The database is posted at http://www.worldbank.org/research/projects/finstructure/database.html

Appendix 2: *The ICRG Risk Components*

In total there are 22 risk components in the ICRG System, which are as follows:

Political Risk Components
Government Stability
Socioeconomic Conditions
Investment Profile
Internal Conflict
External Conflict
Corruption
Military in Politics
Religious Tensions
Law and Order
Ethnic Tensions
Democratic Accountability
Bureaucracy Quality

Financial Risk Components
Foreign Debt as a Percentage of GDP
Foreign Debt Service as a Percentage of XGS
Current Account as a Percentage of XGS
Net Liquidity as Months of Import Cover
Exchange Rate Stability

Economic Risk Components
GDP per Head of Population
Real Annual GDP Growth
Annual Inflation Rate
Budget Balance as a Percentage of GDP
Current Account Balance as a Percentage of GDP

In calculating the ICRG Composite Risk Rating, the political risk rating contributes 50% of the composite rating, while the financial and economic ratings each contribute 25%.