ESSAYS ON FINANCIAL INTEGRATION, FINANCIAL DEVELOPMENT AND ECONOMIC GROWTH

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CHAPTER I

INTRODUCTION

A large body of evidence supports the hypothesis that financial development is a determining factor in economic growth, while less is known about the effect of financial integration on growth. My dissertation analyzes the relationship among financial integration, financial development and economic growth.

The theory of financial integration and growth provides conflicting results about whether integration plays a positive role in real economic growth. Financial integration facilitates capital flows, leads to more efficient allocation of capital and allows international risk sharing. On the other hand, in the presence of weak institutions and informational asymmetries, financial integration may cause additional risks, thus putting financial stability in danger, particularly in developing countries.

The first essay investigates the relation between financial integration and growth. I focus on two related questions: The first is to ask whether financial integration is linked to growth in a statistical sense, and the second is to investigate which factors could help countries receive the benefits of financial integration if financial integration is good for growth.

The complicated issue in the financial integration literature is measuring the extent of integration. Among a wide array of possibilities, two major proxies are used: 1) government restrictions on capital flows and 2) measures of actual international capital flows. The IMF's measure of restrictions on openness provides an indicator of

government restrictions on international financial transactions that is a zero-one dummy. Although the IMF measure is a direct proxy for government impediments, it does not measure the magnitude of the integration. On the other hand, actual international capital flows are good signals of the extent of financial integration that vary over time (i.e., more actual international capital flows simply imply more openness). I therefore use actual international capital flows as proxies for financial integration. For many empirical studies, including mine, de facto measures are more suitable. For instance, some African countries have very few restrictions on capital account openness and would be considered open economy by the IMF measure, yet actual capital flows into those countries are small. Another example is China, where there are extensive restrictions on capital flows but actual flows are quite large.

The potential problem with actual capital flows, of course, is that growth and capital flows may be influenced by the same underlying factors, such as policy changes. I apply the GMM method within panel data VAR systems to ameliorate these endogeneity problems. Using the panel data from 83 countries, I find that financial integration promotes economic growth. But I obtain the most interesting findings when I break total capital flows into inflows, outflows and their FDI and portfolio flow components. Total inflows and total outflows, however, play different roles in growth. Capital inflows lead to economic growth in emerging market economies, while outflows have positive effects on growth in developed countries and negative effects on growth in emerging markets. Interestingly, when further breaking down total capital flows into FDI and portfolio investment, I find that FDI is responsible for the positive and significant effects of inflows on growth in emerging markets, while portfolio outflows affect growth in

developed markets more than FDI outflows do. It is my belief that the positive effect of FDI in emerging markets is due to the lack of capital in those countries, while the fact that portfolio inflows do not affect growth can be attributed to weak financial institutions. Thus, my analysis offers insights into which forms of openness should be encouraged by policymakers at varying stages of economic development.

The second essay examines the paths through which financial integration may affect growth. Macroeconomic indicators, such as inflation rate, budget deficits, exchange rate and the quality of the institution, also have an important impact on the link between financial development and growth. Inspired by previous studies, I examine the effect of financial integration on the link between financial development and growth using the rolling window technique. The rolling window method reveals the entire evolutionary process of the nexus based on the level of financial integration, rather than the threshold alone. Using a series of cross-country growth regressions with a rolling window of countries based on the level of integration, I find that financial development promotes economic growth when there is a moderate amount of financial integration.

The effect of financial integration on the finance-growth nexus leads to further studies on financial development and financial integration. Acemoglu et al. (2001, 2004) put forward the economic institutions hypothesis, which proposes that the existence of the economic institutions that help protect property rights are the fundamental cause of the differences in economic development. Deep fundamentals, such as a nation's legal origin, the quality of the law enforcement and the political environment can affect financial development. Countries can be divided into four categories according to their legal origins: the English common law tradition and the French, German, and

Scandinavian civil law tradition. Based on previous studies, I examine the joint effect of the legal and political factors on financial development and financial integration, respectively. I find that an economy's financial development and financial integration are different but related in that the deep fundamental conditions of a nation, such as legal origin and political factors, have an effect on both financial development and financial integration. However, they may have different effects on growth as argued in the literature.

The third essay examines the development of equity markets. The explosive growth of equity markets in both emerging and developed markets in recent years has prompted both economists and policymakers to pay more attention to their impact on growth. The financial system consists of banks, non-bank financial institutions (such as insurance companies) and stock markets. The stock market allows companies to publicly issue and trade shares at a given price, which is another important source for companies to obtain external funds outside of the banking system. The most important advantage of investing in the stock market is liquidity: both the investors and entrepreneurs have the ability to sell the securities quickly and easily. Financial services provided by stock markets are thus different from the services provided by banks.

In the more recent dataset (1990-2003), Rousseau and Wachtel (2011) found that the effect of financial development on growth is not as strong as it was in the previous period (1960-1989). However, they examined only the effect of bank sectors on growth. Inspired by their findings, I investigate the role of both stock markets and bank sectors in growth based on a larger and more recent dataset, 63 countries over the period 1990-2005. The empirical results suggest that, in the recent dataset, bank sectors do not have a

positive effect on growth, an outcome that is consistent with the findings in Rousseau and Wachtel (2011). However, stock market liquidity still has a positive and significant effect on growth when the total value traded is used as the measure. The other three measures of equity market development, including market capitalization, which measures the size of stock markets, do not have significant effects on growth. The findings imply that the liquidity of the stock markets is more important than the size of the market in accelerating economic growth. In addition, the results from the VAR models also suggest that the effect of stock market liquidity on growth is stronger in the more recent period than in the previous period 1980-1995.

CHAPTER II

FINANCIAL INTEGRATION AND ECONOMIC GROWTH

Review of Literature

The theory relating financial integration to growth provides conflicting results about whether integration can play a positive role in real economic growth. In the neoclassical model, financial integration facilitates capital flows, which enhance private savings and investments, thus freeing poor countries from a binding constraint on economic growth. On a global level, financial integration can strengthen the domestic financial system by leading to a more efficient allocation of capital, thereby promoting international risk-sharing. Obstfeld (1994) shows that international diversification of risks allows countries to shift away from low-return safe investments to high-return riskier ones, which can ultimately increase growth. Further, financial integration can reduce the volatility of consumption and raise welfare (Lucas 1987, Van Wincoop 1994, Jose De Gregorio 1999). For example, Epaulard and Pommeret (2005) obtain a significant welfare gain from capital market liberalization by calibrating a theoretical model of 32 developing and emerging economies over the period 1990-1998. Specifically, they find that financial integration leads to about 0.3 percentage points of additional growth per year. In addition to the above benefits, capital flows such as foreign direct investment can help transfer advanced technology to developing countries, which can have a significant impact on productivity growth.

On the other hand, there are some arguments against financial integration. In the presence of weak institutions and information asymmetries, countries integrated with and open to the international capital market may lack the ability to absorb external capital into new investment. Financial integration may also increase risk, thus jeopardizing financial stability, particularly in developing countries without well-established financial systems and good policies to regulate them.

Theoretical disagreements about financial integration and its benefits have led to a burgeoning yet inconclusive empirical literature. Empirical work by Grilli and Milesi-Ferretti (1995) and Kraay (1998) have not found a robust, long-term growth effect of the IMF's measure of restrictions on openness. Recent studies by Levine and Edison (2002) examine an extensive array of financial integration measures, including capital flows, the IMF's measure of restrictions on openness, and the Quinn's measure of capital account restrictions, and find that each indicator has advantages and disadvantages. They also assess whether the effects of financial integration on growth depend on the level of economic development, financial depth, legal systems, government corruption, and macroeconomic policies such as inflation and fiscal imbalances. The conclusion they reach is that "financial integration does not accelerate economic growth, even when controlling for particular economic, financial institutional, and policy characteristics." Moreover, De Gregorio (1999) reports an interesting result that financial integration has a positive effect on the financial depth of domestic economies, while showing no direct effect on economic growth.

Unlike the theoretical results obtained by Epaulard and Pommeret (2005), Gourinchas and Jeanne (2006) show that the welfare gains from capital market

liberalization are elusive and small when considered empirically. Since consumption is regarded as a better measure of welfare than output, another related literature focuses on how financial integration affects fluctuations in consumption rather than welfare. Prasad, Rogoff, Wei and Kose (2007) argue that there is little evidence that financial integration has helped stabilize consumption. They find that low to moderate levels of financial integration may lead to greater volatility of consumption, but that volatility starts to decline once the level of integration crosses an upper threshold. From this point of view, financial instability and crises can be expected as growing pains in the process of financial globalization. [1]

At the same time, Quinn (1997), Bekaert (2001) and Edwards (2001) find support for a relationship between openness and economic growth. Quinn and Toyoda (2008) show that capital account liberalization has an independent and positive role on growth in both developed and emerging markets. They reexamine some previous results, such as the findings of Grilli and Milesi-Ferretti (1995) and Edison *et al*. (2004), and argue that the controversial results of these earlier studies may partly result from measurement error in capital account variables, time periods studied, methodological choices, and the use of purchasing power parity adjusted data versus data on real growth in local currency units. Using pooled time-series, cross-sectional OLS and system GMM estimation on data from 94 countries for the period from 1955 to 2004, they find support for a role of capital account liberalization on growth.

Schularick and Steger (2006) shed new light on the nexus between financial integration and growth by examining evidence from the first era of financial globalization

[1] The *World Economic Outlook* (IMF 2002) also provides some evidence that financial integration is associated with a lower level of output volatility in developing countries.

from 1880 to 1912 using the data from 24 developing and developed countries. Using results from different estimation techniques, they support the studies that emphasize the virtues of international capital mobility. Edwards (2001) determines that the effect of the IMF measure on growth depends on the level of income. In other words, the IMF measure is negatively correlated with growth in wealthy countries, but positively correlated with growth in poor countries. Kaminsky and Schmukler (2003) focus on the link between financial integration and crises, and find that financial integration leads to more short-run, boom-bust cycles, but a more stable market in the long run.

This paper takes inspiration from the rich literature that pioneered empirical studies in this area. In particular, based on the broad measures of financial integration in Levine (2002), this paper examines the contribution of total capital flows, total capital inflows and total capital outflows on financial integration and economic growth. All three measures can be further subdivided into two types of flows: foreign direct investment (FDI) and portfolio investment. In the light of the different roles that these forms may play in investment (see Mody and Murshid, 2005), this paper distinguishes between FDI and portfolio flows components of total flows and finds that FDI and portfolio flows have different effects on growth.

That empirical research on the financial integration-growth nexus remains inconclusive is partly the result of the wide variety of approaches and econometric methodologies employed to study the issue. In this paper, I rely on the measures of financial integration and methodologies used in the literature that first motivated the empirical investigation of financial integration-growth nexus and financial development-growth nexus. In particular, I rely on the works of Levine (2002) and Rousseau and

Wachtel (2000) respectively to execute a series of vector autoregressions (VARs) with panel data using an adaptation of the generalized method of moments (GMM) technique. For the sake of comparability with earlier cross-sectional studies, a dataset of 83 countries from 1960 to 2008 is applied. These include 44 developed countries and 39 emerging market countries.

Data and Measures of Financial Integration

To examine the relationship among economic growth, financial integration and financial development, I use per capita real gross domestic product (GDP) to measure economic performance. I also choose the most common measure of financial development, namely the stock of liquid liabilities (M3). This allows me to focus primarily on the growth effects of several different measures of financial integration. Both real GDP per capita and M3 are continuously available from the 2010 edition of World Bank's *World Development Indicators* for all 83 countries.

The complicated issue in the financial integration literature is, of course, measuring the extent of integration. Among a wide array of possibilities, two major proxies are used: 1) government restrictions on capital flows and 2) measures of actual international capital flows. The IMF's measure of restrictions on openness provides an indicator of government restrictions on international financial transactions that is a zero-one dummy. Although the IMF measure is a direct proxy for government impediments, it does not measure the magnitude of the integration. On the other hand, actual international capital flows are good signals of the extent of financial integration that vary over time (i.e., more actual international capital flows simply imply more openness). This paper

therefore uses actual international capital flows as proxies for financial integration. The potential problem with actual capital flows, of course, is that growth and capital flows may be influenced by the same underlying factors, such as policy changes. I apply the GMM method within panel data VAR systems to ameliorate these endogeneity problems.

The three major measures used in this paper are: 1) total flows of capital, which accumulates inflows and outflows for both FDI and portfolio investment; 2) total inflows of capital, which is the sum of FDI and portfolio inflows; and 3) total outflows of capital, which accumulates FDI and portfolio outflows. To examine the different effects of FDI and portfolio investment on economic growth, I also experiment with VAR systems that include the following four additional indicators: 1) FDI inflows, which equals FDI received by domestic countries; 2) portfolio debt investment (inflows), which represents foreign countries' investment in domestic countries; 3) FDI outflows, such as domestic countries' direct investment in foreign countries; and 4) portfolio equity investment (outflows), such as domestic countries' portfolio investment in foreign countries.

I obtained the data for FDI and portfolio investment flows from the IMF's *International Financial Statistics* (IFS), measured in current U.S. dollars. To express the data in real terms, I then deflated them using implicit price deflators for GDP computed from *World Development Indicators*. In the resulting tri-variate panel VARs, I use the logarithm of real value in per capita terms. The selection of countries and time period is based on the availability of data from the IMF source.

Previous empirical studies suggest that financial integration has a positive effect on growth under certain conditions, such as a well-established financial system, higher levels of economic development and particular macroeconomic policies. I focus on

whether rich countries benefit more from such financial integration than poor ones. To investigate whether the financial integration-growth nexus depends on the level of income, I sort the full sample of 83 countries into two groups, with 44 developed countries and 39 emerging ones as classified by the World Bank.[2] For comparability I run the tri-variate panel data vector autoregression (VAR) with GMM for all three groups.

Methodology

The econometric method used to assess the relationships between economic growth, financial development and financial integration is the panel data VAR, with an adaptation of the GMM technique developed by Arellano and Bond (1991) and Arellano and Bover (1995).

There are clear advantages in using panel data, which contains multiple observational units for multiple periods, allowing us to take advantage of information available in both the cross section and time series, especially when the time dimension is relatively small. Most of the recent empirical studies in the growth literature take non-overlapping, five-year averages or ten-year averages of annual data. The average can characterize the steady state relationship between growth and other explanatory variables, yet may filter out some potentially useful information contained in the annual time series.

[2] The 44 developed countries are Algeria, Argentina, Australia, Austria, Barbados, Belgium, Brazil, Canada, Chile, Colombia, Costa Rica, Denmark, Dominican Republic, Fiji, Finland, France, Greece, Iceland, Ireland, Israel, Italy, Jamaica, Japan, Republic of Korea, Malaysia, Malta, Mauritius, Mexico, the Netherlands, New Zealand, Norway, Panama, Peru, Portugal, South Africa, Spain, Sweden, Switzerland, Trinidad and Tobago, Turkey, United Kingdom, United States, Uruguay and Venezuela. On the other hand, the 39 emerging market economies are Bangladesh, Bolivia, Cameroon, Central African Republic, Cote d'Ivoire, Ecuador, Egypt, El Salvador, Gambia, Ghana, Guatemala, Guyana, Haiti, Honduras, India, Indonesia, Iran, Jordan, Kenya, Lesotho, Malawi, Morocco, Nepal, Nicaragua, Niger, Nigeria, Pakistan, Papua New Guinea, Paraguay, the Philippines, Rwanda, Senegal, Sierra Leone, Sri Lanka, Sudan, Syrian Arab Republic, Thailand, Togo and Zimbabwe.

Further, five-year averaging also results in an 80 percent reduction of the number of the observations. The time period under analysis in this paper is from 1960 to 2008. There are 49 observations if annual data are used; however, there are 10 five-year averages observations and only 5 ten-year averages. The system GMM method further decreases the number of time series observations available for the estimation since differences and lags of the variables are involved. To maximize the use of the time and cross-country dimensions of available data sets, I therefore use a panel with annual data.

In a panel of N countries for T years, the tri-variate vector autoregressions with fixed effects take the form

$$y_{i,t} = \sum_{j=1}^{k} a_{1,j} y_{i,t-j} + \sum_{j=1}^{k} b_{1,j} f_{i,t-j} + \sum_{j=1}^{k} c_{1,j} m_{i,t-j} + \eta_{1,i} + \phi_{1,t} + \varepsilon_{1,i,t}, \quad (1a)$$

$$f_{i,t} = \sum_{j=1}^{k} a_{2,j} y_{i,t-j} + \sum_{j=1}^{k} b_{2,j} f_{i,t-j} + \sum_{j=1}^{k} c_{2,j} m_{i,t-j} + \eta_{2,i} + \phi_{2,t} + \varepsilon_{2,i,t}, \quad (1b)$$

$$m_{i,t} = \sum_{j=1}^{k} a_{3,j} y_{i,t-j} + \sum_{j=1}^{k} b_{3,j} f_{i,t-j} + \sum_{j=1}^{k} c_{3,j} m_{i,t-j} + \eta_{3,t} + \phi_{3,t} + \varepsilon_{3,i,t}, \quad (1c)$$

where $y_{i,t}$ is the measure of economic growth (real GDP per capita) for country i at time t, $m_{i,t}$ is real liquid liabilities per capita (M3), and $f_{i,t}$ is a measure of financial integration (total real capital flows, inflows or outflows per capita), η_i is a country-specific fixed effect, ϕ_t is a time-fixed effect, $\varepsilon_{i,t}$ is a random disturbance that approximates the normal distribution, and k is the lag order. I assume that the error term $\varepsilon_{i,t}$ is orthogonal to the fixed and time effects as well as the lagged values of the endogenous variables, and that they are not serially correlated. I use the fixed effects model instead of random effects since the η_i are likely to represent omitted country-specific characteristics that are

correlated with the other explanatory variables. Time effects account for trending behavior in the system variables.

As to the variables on the right hand side of (1), all lagged values of the dependent variables are potentially endogenous. The presence of fixed effects in a data set with a small time dimension is also known to lead to biased estimates in the least squared dummy variable (LSDV) regression. System GMM estimation can overcome these problems. To do this, I write the regression equation as a dynamic panel model, take first-differences to remove unobserved time-invariant country-specific effects, and then instrument the independent variables using the predetermined lags of the system.

After taking first-differences, the first equation in the VAR (1a) becomes

$$(\mathrm{y_{i,t}} - \mathrm{y_{i,t\text{-}1}}) = \sum_{\mathrm{j}=1}^{\mathrm{k}} \mathrm{a_{1,j}}(\mathrm{y_{i,t-j}} - y_{i,t-j-1}) + \sum_{\mathrm{j}=1}^{\mathrm{k}} \mathrm{b_{1,j}}(\mathrm{f_{i,t-j}} - f_{i,t-j-1}) + \sum_{\mathrm{j}=1}^{\mathrm{k}} c_{1,\mathrm{j}}(\mathrm{m_{i,t\text{-}j}} - m_{i,t-j-1})$$

$$+ (\phi_{1,t} - \phi_{1,t-1}) + (\varepsilon_{1,\mathrm{i,t}} - \varepsilon_{1,i,t-1}). \qquad (2)$$

The other equations in the VAR system can be differenced similarly. In equation (2), the country dummies have been differenced out, and the only remaining endogeneity problem is caused by correlation between the first lags of the system variables and the new error term $(\varepsilon_{i,t} - \varepsilon_{i,t-1})$. Under the assumption that the error term $\varepsilon_{\mathrm{i,t}}$ is not serially correlated, the *difference GMM* dynamic panel estimator uses the following moment conditions to deliver the coefficient estimates:

$$\mathrm{E}[\mathrm{y_{i,t\text{-}j}} \cdot (\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0, \qquad \text{for } \mathrm{j} \geq 2; \mathrm{t} = 3, ..., \mathrm{T}, \qquad (3)$$

$$\mathrm{E}[\mathrm{f_{i,t\text{-}j}} \cdot (\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0, \qquad \text{for } \mathrm{j} \geq 2; \mathrm{t} = 3, ..., \mathrm{T}, \qquad (4)$$

$$\mathrm{E}[\mathrm{m_{i,t\text{-}j}} \cdot (\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0, \qquad \text{for } \mathrm{j} \geq 2; \mathrm{t} = 3, ..., \mathrm{T}. \qquad (5)$$

There are statistical shortcomings with this first-difference GMM estimator. Alonso-Borrego and Arellano (1999) and Blundell and Bond (1998) show that persistent explanatory variables over time can make lagged levels weak instruments for the regression equations in differences. In small samples, such weak instruments can bias the coefficients. To reduce the potential biases and imprecision with the first-difference estimator, I use the system GMM estimator that combines the regression in differences with a regression in levels (Arellano and Bover, 1995 and Blundell and Bond, 1998). Lagged differences of the related explanatory variables are used as instruments for the regression in levels, while lags of the related explanatory variables are instruments for the regression in differences shown above.

The additional moment conditions for the regression in levels are:

$$E[(y_{i,t-j} - y_{i,t-j-1}) \cdot (\eta_i + \varepsilon_{i,t})] = 0, \qquad \text{for j=1} \tag{6}$$

$$E[(f_{i,t-j} - f_{i,t-j-1}) \cdot (\eta_i + \varepsilon_{i,t})] = 0, \qquad \text{for j=1} \tag{7}$$

$$E[(m_{i,t-j} - m_{i,t-j-1}) \cdot (\eta_i + \varepsilon_{i,t})] = 0, \qquad \text{for j=1.} \tag{8}$$

Two types of test are used to examine the consistency of the system GMM estimator. The first type includes the Sargan and Hansen tests of over-identification, which test the joint validity of the instruments by examining the moment conditions used in the estimation.[3] The null hypothesis is that the instrument set is valid and that the model is not over-identified. The second type is the AR test, which examines whether there is serial correlation in the error terms. The test depends on large N and relatively

[3] Only the results of Sargan tests are reported in this paper, since Hansen test can be greatly weakened by the proliferation of instrument.

small T and has a null hypothesis of no serial correlation. I check for both first-order and second-order serial correlation.

Empirical Results

1. Economic Growth, Financial Integration and Financial Development

Treating total flows of capital, total inflows of capital, and total outflows of capital as three different measures of financial integration, I proceed to estimate three VAR models. The results for these models are shown in table 1, table 2 and table 3, respectively. As mentioned in section 2, to investigate whether the financial integration-growth nexus depends on the level of income, I sort the full sample (83 countries) into developed countries (44 countries) and emerging market economies (39 countries). For the sake of comparability, each table contains a panel corresponding to each group.

To indicate the direction of the causal effects, I report the sum of the coefficients on the k lags of each of the explanatory variables. Two lags are included in each VAR. The selection of the number of lags is based on the results of a series of nested likelihood ratio tests. The Sargan test examines the joint validity of the instruments, and the AR tests examine the serial correlation of error terms. Those two tests together determine the consistency of the GMM estimators. Crucially, second-order serial correlation should be absent and the instrument set should not be over-identified.

Table 1 reports the relationship among real GDP per capita, total flows of capital and liquid liabilities. The cumulative coefficients on the two lags of the explanatory variables are reported, with the p-value of the joint test for block exogeneity in parentheses. The cumulative coefficients on total flows in equation 1 are positive and

Table 1. Panel System GMM Estimates for VAR with per Capita Real GDP, Total Capital Flows and Liquid Liabilities (M3), 1960-2008

Countries	Equation	Dependent variable	GDP	Total flows	Liquid liabilities	AR(1) AR(2)	Sargan
Full sample	1	GDP	0.9907**	0.0019**	0.0071*	0.0000	0.2880
			(0.0000)	(0.0057)	(0.0050)	0.6770	
	2	Total flows	0.2762**	0.8049**	0.0128	0.0000	0.8580
			(0.0000)	(0.0000)	(0.4829)	0.6730	
	3	Liquid liabilities	0.0388**	0.0016	0.9663**	0.0000	0.2530
			(0.0000)	(0.3423)	(0.0000)	0.2510	
Developed	1	GDP	0.9916**	0.0032*	0.0019	0.0000	0.5040
			(0.0000)	(0.0995)	(0.6622)	0.3850	
	2	Total flows	0.3430**	0.7771**	-0.0155	0.0000	0.8730
			(0.0009)	(0.0000)	(0.7723)	0.4160	
	3	Liquid liabilities	0.0566**	0.0045	0.9476**	0.0000	0.5330
			(0.0000)	(0.2007)	(0.0000)	0.2280	
Emerging	1	GDP	0.9847**	0.0009	0.0123**	0.0000	0.2000
			(0.0000)	(0.4556)	(0.0029)	0.1220	
	2	Total flows	0.1679	0.7870**	0.0703	0.0000	0.3200
			(0.1586)	(0.0000)	(0.1029)	0.4870	
	3	Liquid liabilities	0.0150*	0.0001	0.9916**	0.0000	0.4820
			(0.0052)	(0.9635)	(0.0000)	0.8810	

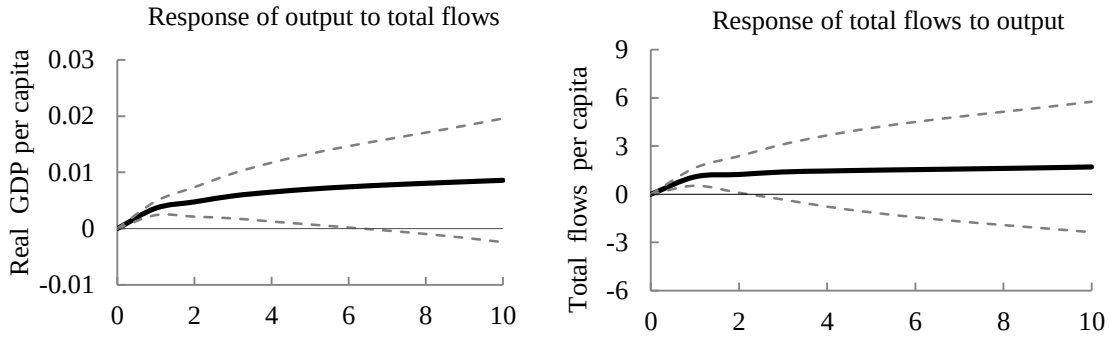
Note: The table reports cumulative coefficients from system GMM estimation for two lags of each system variable in a three-variable VAR, with the p-values for Granger-causality tests in parentheses. The symbols * and ** denote statistical significance at the 10 percent and 5 percent levels, respectively. P-values for the Sargan and AR test results are reported in the last two columns. Results for the AR (1) test are in the first row, and the results for the AR (2) test are in the second row for each equation. Year dummies are included in the equations but are not reported. GDP, total capital flows, and M3 are all in logs of per capita constant 2000 U.S. dollars.

significant for the full sample and for the developed countries, yet the positive cumulative coefficient on total flows for emerging countries is not statistically significant. This suggests that the developed countries benefit more from the total capital flows than do the emerging market economies. In addition, the coefficients on liquid liabilities in equation 1 for the full sample and the emerging countries are positive and significant, while they are not significant for the developed ones. The results are consistent with the leading role for financial factors in output in the extant literature. The Sargan and AR test results are reported in the last two columns. The Sargan test indicates that the instruments are valid and that the specifications are not over-identified. By construction, the differenced error term could be first-order serially correlated, while second-order serial correlation should be absent. AR (1) test has a p-value of zero and AR (2) test has a p-value of 0.677 for equation 1 in the full sample, which indicate that the model cannot be rejected due to serial correlation.

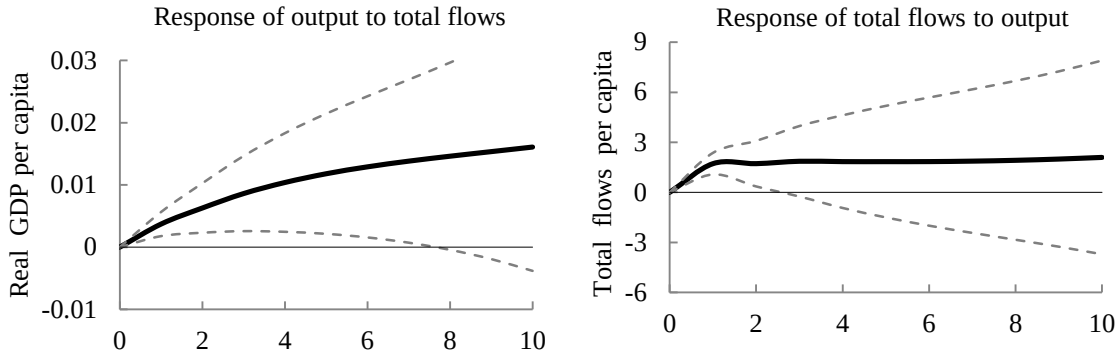
As to equation 2 and equation 3, which use total capital flows and liquid liabilities (M3) as the dependent variables, real GDP per capita has a positive and significant effect on total capital flows in the full sample and for the developed countries. There is no evidence of feedback, however, from real GDP per capita to total capital flows in emerging market countries. In equation 3, real GDP per capita enters the equation with a positive sum of coefficients for all three groups of countries. This outcome suggests the presence of feedback from GDP to financial development. Because these equations also pass the specification tests defined above, I do not reject the validity of the specification.

Figure 1 reports selected impulse response functions with a ten-year horizon for the above system. The solid line is the mean impulse response and the dotted lines are

Panel a: Full sample of countries



Panel b: Developed countries



Panel c: Emerging markets

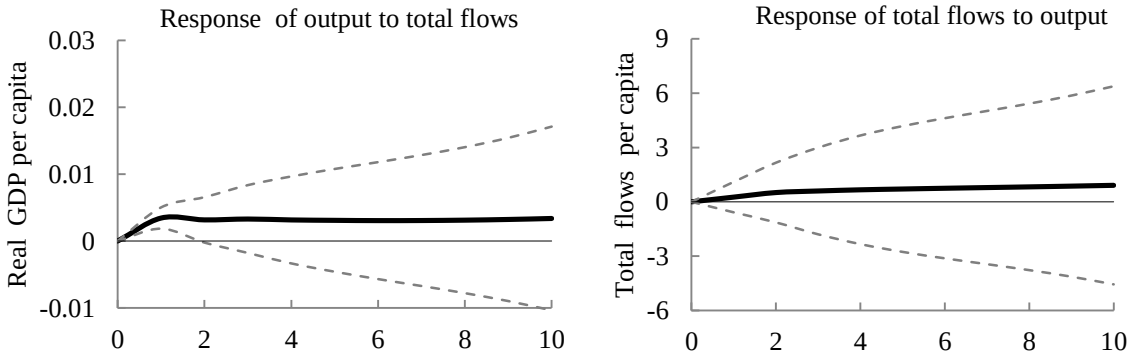


Fig. 1. Selected Impulse Responses for Panel VAR Systems with GDP, Financial Development and Total Capital Flows, 1960-2008

Note: Panels a, b and c show selected responses in three-variable systems for the full sample of countries, developed countries and emerging markets, respectively. In each panel, the graph on the left shows the responses of real GDP per capita to a one unit shock in total flows per capita, while the graph on the right shows the responses of total flows per capita to a one unit shock in real GDP per capita. Based on the Monte Carlo integration technique described in Doan (1995), the thick solid lines show the mean impulse responses that result from 1,000 random draws from the estimated distribution of the coefficients in each system, and the dotted lines are one standard deviation bands.

one standard error bands. For the full sample (panel a), the response of real GDP per capita to a one unit shock in the log of total flows per capita is substantial. Specifically, the cumulative effect rises quickly for 3 years before gradually leveling off, with the lower standard error band remaining above zero for 6 years. In addition, the cumulative response of output to a one unit shock in capital flows for developed countries (panel b) is larger and is sustained longer than the response for emerging markets (panel c). This is consistent with the Granger-causality tests. Meanwhile, the responses of total flows to a one unit shock in real GDP confirm the presence of feedback from output to total flows in developed countries but not in emerging market economies. It thus seems that the relationship between total capital flows and output in emerging market economies is uni-directional.

In tables 2 and 3, I repeat the analysis for total inflows and total outflows of capital respectively. Again, both two systems pass the specifications tests defined above. As in the results obtained in table 1, financial development has a leading role in economic growth for the full sample and the emerging market economies, and real GDP per capita has feedback to financial development for all three country groups. However, total capital inflows and total capital outflow play different roles with respect to real output.

In table 2, the cumulative effects of total inflows on real GDP per capita are positive and significant for the full sample and emerging market economies, but are not significant for the group of developed countries. Most emerging market countries suffer from lack of capital. Capital inflows can increase the availability of the capital to firms, thus freeing poor countries from a binding constraint on economic growth. Capital inflows can also improve the function of the financial system and help transfer advanced

Table 2. Panel System GMM Estimates for VAR with per Capita Real GDP, Total Capital Inflows and Liquid Liabilities (M3), 1960-2008

Countries	Equation	Dependent variable	GDP	Total inflows	Liquid liabilities	AR(1) AR(2)	Sargan
Full sample	1	GDP	0.9910**	0.0017**	0.0071**	0.0000	0.3630
			(0.0000)	(0.0113)	(0.0046)	0.8630	
	2	Total inflows	0.3666**	0.7348**	-0.0131	0.0000	0.2860
			(0.0000)	(0.0000)	(0.8989)	0.2150	
	3	Liquid liabilities	0.0354**	0.0021	0.9685**	0.0000	0.7020
			(0.0000)	(0.3420)	(0.0000)	0.2530	
Developed	1	GDP	0.9940**	0.0012	0.0024	0.0000	0.6840
			(0.0000)	(0.4562)	(0.6142)	0.2870	
	2	Total inflows	0.3636**	0.7825**	-0.0673	0.0000	0.7340
			(0.0000)	(0.0000)	(0.2639)	0.6040	
	3	Liquid liabilities	0.0558**	0.0020	0.9519**	0.0000	0.7980
			(0.0000)	(0.4129)	(0.0000)	0.2500	
Emerging	1	GDP	0.9801**	0.0017**	0.0142**	0.0000	0.0760
			(0.0000)	(0.0264)	(0.0015)	0.4160	
	2	Total inflows	0.2244	0.7186**	0.0932*	0.0000	0.1150
			(0.1428)	(0.0000)	(0.0903)	0.1480	
	3	Liquid liabilities	0.0158**	0.0016	0.9895**	0.0000	0.6450
			(0.0069)	(0.8312)	(0.0000)	0.6930	

Note: See note to Table 1. GDP, total capital inflows, and M3 are all in logs of per capita constant 2000 U.S. dollars.

Table 3. Panel System GMM Estimates for VAR with per Capita Real GDP, Total Capital Outflows and Liquid Liabilities (M3), 1960-2008

Countries	Equation	Dependent variable	GDP	Total outflows	Liquid liabilities	AR(1) AR(2)	Sargan
Full sample	1	GDP	0.9960** (0.0000)	0.0003** (0.0449)	0.0044** (0.0239)	0.0000 0.2590	0.3200
	2	Total outflows	0.3822** (0.0046)	0.7561** (0.0000)	0.0652 (0.3041)	0.0000 0.4950	0.9590
	3	Liquid liabilities	0.0515** (0.0000)	-0.0014 (0.7204)	0.9596** (0.0000)	0.0000 0.2920	0.6140
Developed	1	GDP	0.9921** (0.0000)	0.0044** (0.0142)	-0.0014 (0.3454)	0.0000 0.9210	0.4030
	2	Total outflows	0.4397** (0.0374)	0.7231** (0.0000)	0.1016 (0.2583)	0.0000 0.8690	0.5780
	3	Liquid liabilities	0.0735** (0.0000)	0.0075* (0.0910)	0.9302** (0.0000)	0.0010 0.2670	0.7420
Emerging	1	GDP	0.9896** (0.0000)	-0.0017* (0.0672)	0.0103** (0.0094)	0.0000 0.3080	0.1440
	2	Total outflows	-0.0809 (0.8773)	0.7137** (0.0000)	0.2693 (0.1759)	0.0000 0.3730	0.7970
	3	Liquid liabilities	-0.0023** (0.0252)	-0.0063* (0.0862)	1.0022** (0.0000)	0.0000 0.7460	0.0330

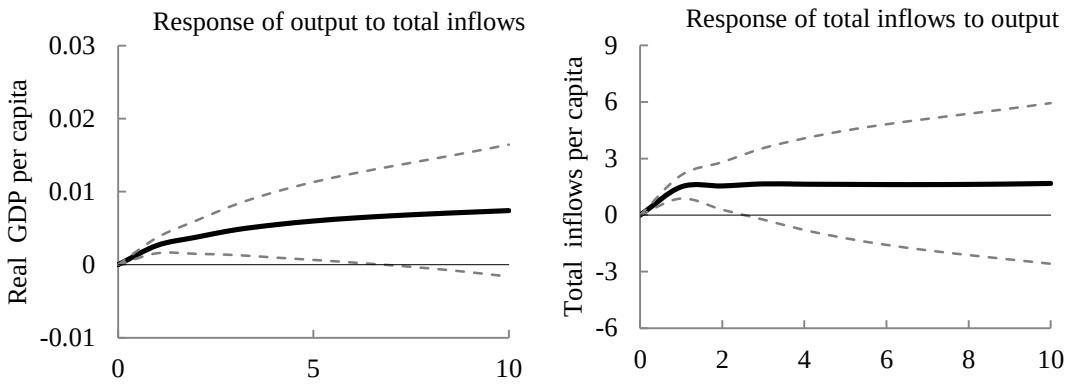
Note: See note to Table 1. GDP, total capital outflows, and M3 are all in logs of per capita constant 2000 U.S. dollars.

technologies and skills to emerging market countries. However, capital inflows do not have a significant impact on real GDP per capita in developed market economies. Rather, capital market openness benefits these economies through the international risk-sharing channel instead of the investment channel. Capital inflows to developed countries lead to more efficient allocation of resources and serve to diversify investments. In summary, real GDP per capita has a positive and significant effect on the total capital inflows in the full sample and the developed countries.

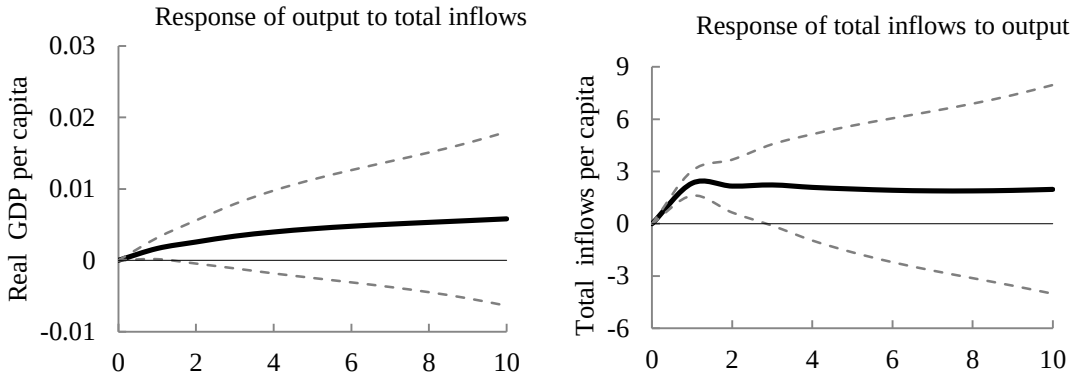
As to the measure of capital outflows, total outflows have a positive and significant effect on real GDP per capita for both the full sample and the developed countries, while the total outflows have a negative and significant effect on real output in the emerging market countries. As a consequence of the opposite sign of the coefficient on total outflows for developed countries and emerging market countries, the overall effect of outflows on growth in the full sample is much smaller than the effect of total capital outflows on growth in the developed countries. The positive effect of total outflows suggests that developed market economies could benefit from the outflows since capital tends to flow to more productive uses, which provide a higher rate of return irrespective of location.

On the other hand, capital outflows harm emerging market economies due to the lack of capital in those countries. Capital outflows from emerging market economies are certainly feasible. For instance, countries with weak financial systems and institutions cannot provide a sound environment with sufficient protection for investors, a situation that may result in capital outflows from capital-scarce countries to capital-abundant countries with better financial systems and policies.

Panel a: Full sample of countries



Panel b: Developed countries



Panel c: Emerging markets

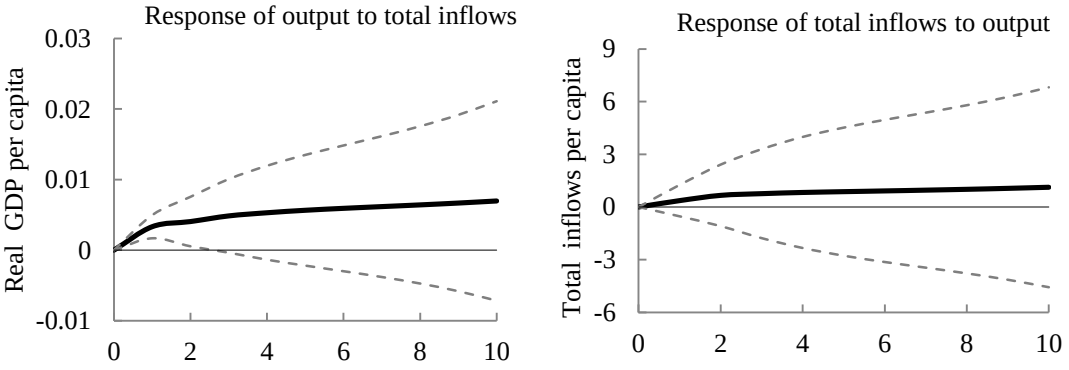
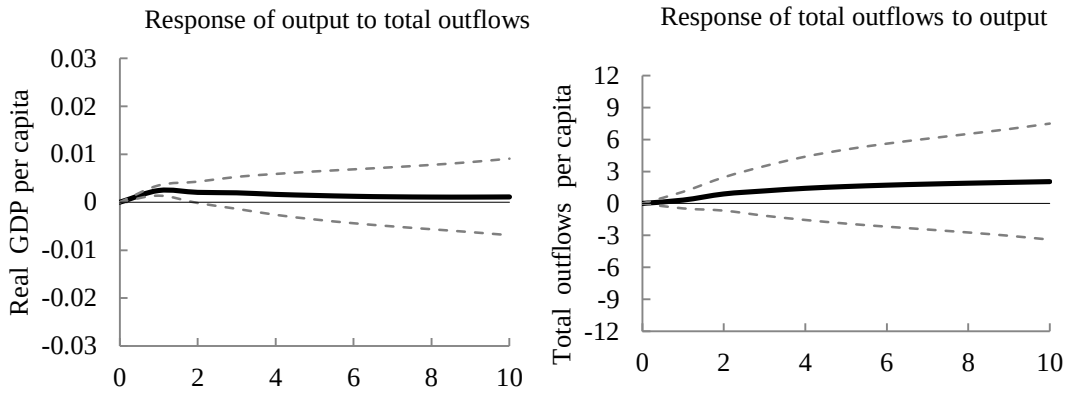


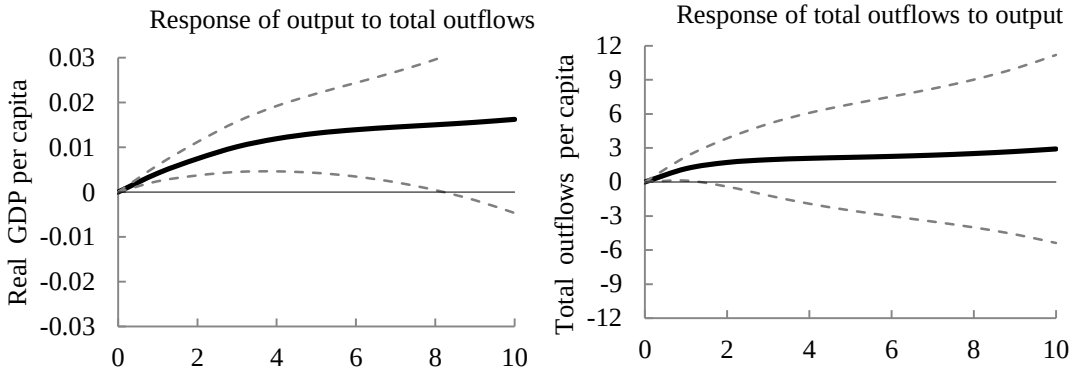
Fig. 2. Selected Impulse Responses for Panel VAR Systems with GDP, Financial Development and Total Capital Inflows, 1960-2008

Note: See note to Fig. 1. This set of impulse responses uses total capital inflows as the measure of financial integration.

Panel a: Full sample of countries



Panel b: Developed countries



Panel c: Emerging markets

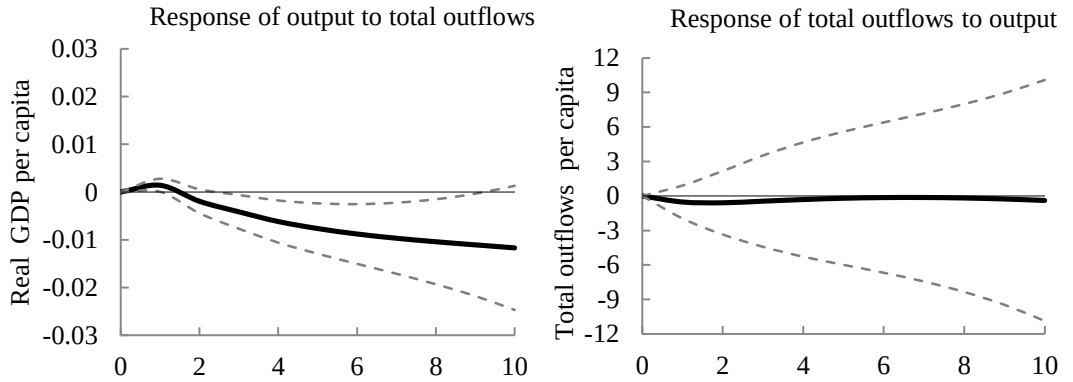


Fig. 3. Selected Impulse Responses for Panel VAR Systems with GDP, Financial Development and Total Capital Outflows, 1960-2008

Note: See note to Fig. 1. This set of impulse responses uses total capital outflows as the measure of financial integration.

Figures 2 and 3 report selected impulse response functions with a ten-year horizon for the systems with total inflows and total outflows. For the full sample (panel a), the response of real GDP per capita to a one unit shock in the log of total inflows per capita is also substantial and gradually leveling off after 3 years. In addition, the cumulative response of output to a one unit shock in capital inflows for emerging markets (panel c) is larger than the response for developed countries (panel b). These responses show that total inflows have a greater effect on GDP per capita in emerging market economies than in developed ones. On the other hand, the responses of output to total outflows in figure 3 indicate that total outflows have a positive and sustained effect on GDP in developed countries and a negative role on GDP in emerging market economies, which further confirm the previous findings. Meanwhile, the responses of total inflows and total outflows to a one unit shock in real GDP confirm that the relationship between total inflows (or total outflows) and output in emerging market economies is uni-directional.

2. Different Effects of FDI and Portfolio Investment on Growth

After examining the different roles of capital inflows and outflows, I further break down total capital flows into four categories to analyze the different functions of FDI and portfolio investment: FDI inflows, portfolio debt investment (inflows), FDI outflows and portfolio equity investment (outflows). Thus, four VAR systems are estimated and each of them includes one of the above categories.

Tables 4 to 7 present the results for the four VAR systems. As in the previous analysis, two lags are included in each VAR system. The cumulative coefficients on the two lags of the explanatory variables are reported, with the p-values of the joint significance tests for block exogeneity in parentheses. Again, all the systems pass the

specification tests defined above, with only a few exceptions. My findings are consistent with the recent literature: Financial development has a positive effect on growth in the full sample and emerging market countries; and real GDP per capita feeds back into financial development for all three country groups.

The regression results for FDI inflows and portfolio debt investment (inflows) show that, for the full sample and emerging market economies, FDI inflows are responsible for the positive and significant effect of inflows on real GDP per capita. On the other hand, there is no evidence that portfolio inflows have an important effect on GDP for all three groups. That the magnitude of the effect of FDI inflows on output is close to the effect of total inflows on output further confirms the above finding. Portfolio inflows do not have an effect on growth in emerging market economies due to the lack of a well-established financial system and good macroeconomic policies. The ability of emerging market countries to absorb portfolio inflows is limited. Meanwhile, the situation of developed countries holding portfolio debt for risk-sharing purposes may lead to the consequence that portfolio inflows do not affect real output. These findings are consistent with the previous results obtained for the system with total capital inflows, which show that the effects of total inflows on real GDP per capita are positive and significant for the full sample and emerging market economies, but not significant for the developed countries.

In addition, real GDP has positive feedback on FDI inflows for both the full sample and the developed countries, but no feedback for emerging market countries. On the contrary, real output has a positive effect on portfolio investment inflows for all three groups. These findings are the consequence of the different characteristics of FDI and

Table 4. Panel System GMM Estimates for VAR with per Capita Real GDP, FDI Inflows and Liquid Liabilities (M3), 1960-2008

Countries	Equation	Dependent variable	GDP	FDI inflows	Liquid liabilities	AR(1) AR(2)	Sargan
Full sample	1	GDP	0.9922**	0.0017**	0.0067**	0.0000	0.1120
			(0.0000)	(0.0207)	(0.0132)	0.9100	
	2	FDI inflows	0.2424**	0.7808**	-0.0127	0.0000	0.3490
			(0.0006)	(0.0000)	(0.9067)	0.8430	
	3	Liquid liabilities	0.0367**	0.0009	0.9692**	0.0000	0.4610
			(0.0000)	(0.6979)	(0.0000)	0.2430	
Developed	1	GDP	0.9944**	0.0015	0.0025	0.0000	0.2510
			(0.0000)	(0.1996)	(0.5556)	0.1330	
	2	FDI inflows	0.2583**	0.7951**	-0.0743**	0.0000	0.9140
			(0.0022)	(0.0000)	(0.0134)	0.4590	
	3	Liquid liabilities	0.0608**	-0.0021	0.9516**	0.0000	0.3890
			(0.0000)	(0.7630)	(0.0000)	0.2430	
Emerging	1	GDP	0.9808**	0.0017*	0.0135**	0.0000	0.0210
			(0.0000)	(0.0939)	(0.0018)	0.2480	
	2	FDI inflows	0.2105	0.7444**	0.0705*	0.0000	0.2200
			(0.1865)	(0.0000)	(0.0704)	0.4840	
	3	Liquid liabilities	0.0160**	0.0041	0.9878**	0.0000	0.9290
			(0.0031)	(0.4923)	(0.0000)	0.5130	

Note: See note to Table 1. GDP, FDI inflows, and M3 are all in logs of per capita constant 2000 U.S. dollars.

Table 5. Panel System GMM Estimates for VAR with per Capita Real GDP, Portfolio Inflows and Liquid Liabilities (M3), 1960-2008

Countries	Equation	Dependent variable	GDP	Portfolio inflows	Liquid liabilities	AR(1) AR(2)	Sargan
Full sample	1	GDP	0.9950** (0.0000)	0.0004 (0.5332)	0.0045* (0.0623)	0.0000 0.5590	0.2620
	2	Portfolio inflows	0.6954** (0.0000)	0.5372** (0.0000)	0.0657 (0.8112)	0.0000 0.2340	0.8390
	3	Liquid liabilities	0.0439** (0.0000)	0.0005 (0.7721)	0.9620** (0.0000)	0.0000 0.2290	0.2320
Developed	1	GDP	0.9969** (0.0000)	0.0000 (0.5980)	0.0013 (0.8199)	0.0000 0.1320	0.4370
	2	Portfolio inflows	0.7785** (0.0001)	0.6013** (0.0000)	-0.0997 (0.6404)	0.0000 0.2180	0.4070
	3	Liquid liabilities	0.0716** (0.0000)	-0.0004 (0.8959)	0.9448** (0.0000)	0.0010 0.2280	0.4710
Emerging	1	GDP	0.9860** (0.0000)	0.0001 (0.9140)	0.0124** (0.0009)	0.0040 0.5320	0.2200
	2	Portfolio inflows	0.0332** (0.0194)	0.6630** (0.0000)	0.3082 (0.5960)	0.0010 0.8350	0.3870
	3	Liquid liabilities	-0.0076* (0.0603)	-0.0022 (0.8409)	1.0022** (0.0000)	0.0010 0.8600	0.2050

Note: See note to Table 1. GDP, portfolio inflows, and M3 are all in logs of per capita constant 2000 U.S. dollars.

Table 6. Panel System GMM Estimates for VAR with per Capita Real GDP, FDI Outflows and Liquid Liabilities (M3), 1960-2008

Countries	Equation	Dependent variable	GDP	FDI outflows	Liquid liabilities	AR(1) AR(2)	Sargan
Full sample	1	GDP	0.9978** (0.0000)	-0.0007 (0.1363)	0.0045** (0.0435)	0.0000 0.3100	0.8950
	2	FDI outflows	0.7197** (0.0008)	0.6304** (0.0000)	-0.0513 (0.1602)	0.0000 0.0090	0.9890
	3	Liquid liabilities	0.0449** (0.0000)	-0.0022 (0.3961)	0.9660** (0.0000)	0.0000 0.3460	0.2870
Developed	1	GDP	0.9988** (0.0000)	0.0016 (0.1232)	-0.0013 (0.3224)	0.0000 0.9680	0.7510
	2	FDI outflows	0.6307** (0.0023)	0.7193** (0.0000)	-0.0579** (0.0441)	0.0000 0.4290	0.6650
	3	Liquid liabilities	0.0785** (0.0000)	0.0027 (0.1473)	0.9363** (0.0000)	0.0010 0.3200	0.8800
Emerging	1	GDP	0.9862** (0.0000)	-0.0022 (0.6581)	0.0119** (0.0005)	0.0060 0.2600	0.0980
	2	FDI outflows	0.0828 (0.7015)	0.6777** (0.0000)	0.1758 (0.1945)	0.0040 0.1860	0.3580
	3	Liquid liabilities	-0.0037 (0.1014)	-0.0065* (0.0838)	1.0067** (0.0000)	0.0030 0.3430	0.5140

Note: See note to Table 1. GDP, FDI outflows, and M3 are all in logs of per capita constant 2000 U.S. dollars.

Table 7. Panel System GMM Estimates for VAR with per Capita Real GDP, Portfolio Outflows and Liquid Liabilities (M3), 1960-2008

Countries	Equation	Dependent variable	GDP	Portfolio outflows	Liquid liabilities	AR(1) AR(2)	Sargan
Full sample	1	GDP	0.9979**	0.0003	0.0025	0.0000	0.7200
			(0.0000)	(0.1597)	(0.1332)	0.2350	
	2	Portfolio outflows	0.1603	0.6584**	0.3499**	0.0000	0.1070
			(0.5890)	(0.0000)	(0.0114)	0.0590	
	3	Liquid liabilities	0.0269**	0.0003	0.9775**	0.0000	0.6580
			(0.0000)	(0.2568)	(0.0000)	0.4700	
Developed	1	GDP	0.9950**	0.0016**	0.0004	0.0000	0.6040
			(0.0000)	(0.0243)	(0.5584)	0.3790	
	2	Portfolio outflows	0.1139	0.6493**	0.3704**	0.0000	0.1780
			(0.7743)	(0.0000)	(0.0214)	0.0180	
	3	Liquid liabilities	0.0320**	0.0045*	0.9679**	0.0010	0.1860
			(0.0003)	(0.0840)	(0.0000)	0.2610	
Emerging	1	GDP	0.9865**	-0.0028	0.0111**	0.0010	0.1140
			(0.0000)	(0.1397)	(0.0151)	0.1890	
	2	Portfolio outflows	-0.5352	0.5818**	0.7394**	0.0010	0.1400
			(0.3280)	(0.0000)	(0.0026)	0.8690	
	3	Liquid liabilities	0.0106	-0.0044	0.9930**	0.0010	0.2280
			(0.1196)	(0.4028)	(0.0000)	0.4420	

Note: See note to Table 1. GDP, portfolio outflows, and M3 are all in logs of per capita constant 2000 U.S. dollars.

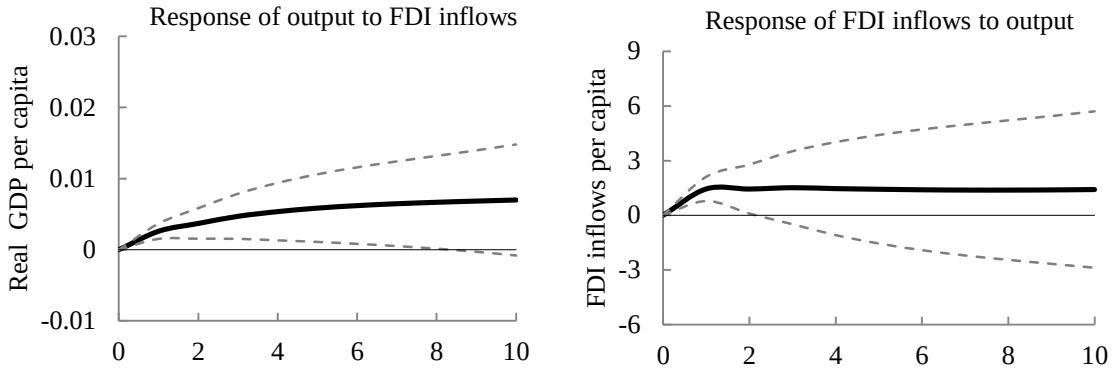
portfolio inflows. The investors of FDI are actively involved in their investments. They make strategic decisions, such as quantities of production and cost control, which allow them to closely monitor and safeguard their investments. On the other hand, the portfolio investors, who purchase the stocks of a number of companies, are not actively involved in the management and everyday business of the companies. Thus, portfolio inflows are more closely related to the level of real GDP than FDI inflows, and it is not surprising to see emerging countries with a low level of output receive FDI from other countries.

The results for FDI outflows and portfolio outflows are included in Tables 6 and 7. FDI outflows do not have a significant effect on growth for all three country groups, while portfolio outflows accelerate economic growth only in developed economies. This outcome suggests that for developed countries, portfolio investment outflows that serve the purpose of diversification can benefit these economies more than FDI outflows.

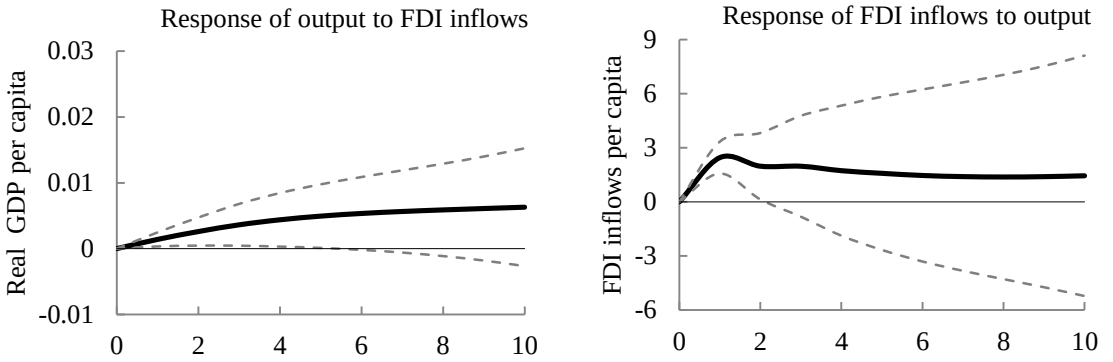
Moreover, real GDP per capita has an effect on FDI outflows for the full sample and the developed countries, but no effect on portfolio outflows for all three country groups. This outcome suggests that only the developed countries with a higher output level have the desire and the ability to invest abroad, while all the countries, regardless of income level, have the motivation to spread risk through portfolio investment.

Figure 4 reports the selected impulse response functions with a ten-year horizon for the system with FDI inflows. For the full sample (panel a), the response of real GDP per capita to a one unit shock in the log of FDI inflows per capita is positive. In addition, the cumulative response of output to a one unit shock in FDI inflows for developed countries (panel b) is smaller, yet lasts longer than the response for emerging markets (panel c), which persist for only 2 years. The responses further support the

Panel a: Full sample of countries



Panel b: Developed countries



Panel c: Emerging markets

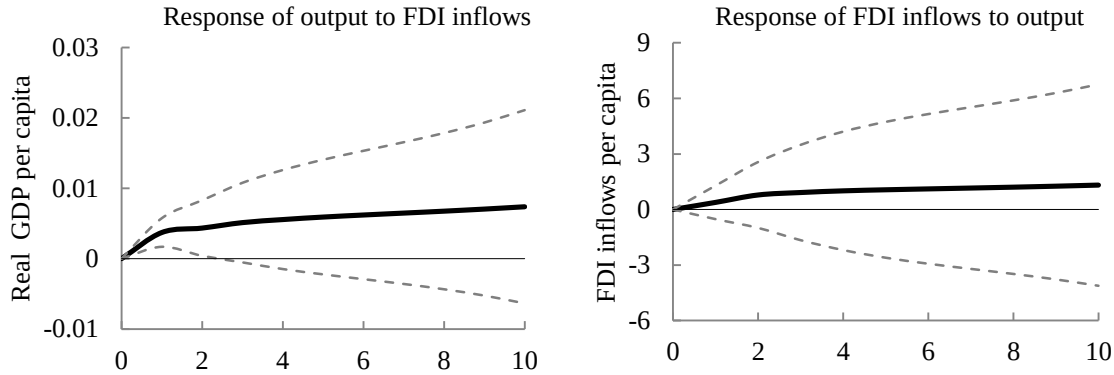


Fig. 4. Selected Impulse Responses for Panel VAR Systems with GDP, Financial Development and FDI Inflows, 1960-2008

Note: See note to Fig. 1. This set of impulse responses uses total capital outflows as the measure of financial integration.

finding that FDI inflows are responsible for the positive and significant effect of inflows on real GDP per capita in emerging market economies, while the effect of FDI inflows in developed countries is not statistically significant. Further, the responses of real GDP to FDI inflows indicate that GDP has positive feedback for developed countries, and there seems to be no feedback for emerging market countries. The impulse responses for portfolio inflows, FDI outflows and portfolio outflows are not reported in this paper, since no important findings were obtained from those systems.

3. Discussion

My findings support the link between financial integration and economic growth, and are consistent with the work of Quinn (1997), Bekaert (2001) and Edwards (2001). The three measures of financial integration that I use are based on those developed by Levine and Edison (2002), yet they reach a different conclusion about the influence of financial integration on growth. Levine and Edison argue that "financial integration does not accelerate economic growth, even when controlling for particular economic, financial institutional, and policy characteristics." The different findings in this paper could be attributed to the following three reasons. First, the dependent variables used in the OLS, two-stage least squares regression and the system GMM panel regression in Levine (2002) represent the growth rate of real GDP per capita. In contrast, the dependent variables in the VAR system with GMM method in this paper represent real GDP per capita since I use real per capita value in levels for all three variables in the VAR system. This means that I focus more on transitional dynamics between steady states than growth rates in the steady states.

Secondly, Levine and Edison (2002) take non-overlapping five-year averages of the annual data for all the variables in the system GMM regression. An average can characterize the steady state relationship between growth and other explanatory variables yet may remove some potentially useful information available in the time series. Five-year averaging also results in an 80 percent reduction of the number of the observations. There are other works that use annual data in a manner similar to mine, such as Rousseau and Wachtel (2000), and Baltagi, Demetriades, and Law (2007).

Finally, a broader data set of 83 countries during the time period from 1960 to 2008 has been applied in this paper, compared to the dataset for 57 countries during the period from 1976 to 2000.

Summary of the Chapter

Utilizing three different measures of international financial integration for 83 countries for the time period from 1960 to 2008, and applying the panel data VAR model with an adaptation of the GMM method, I find that financial integration promotes real economic growth. The three measures of financial integration, however, have different effects on growth. First, the effect of total capital flows on growth depends on the level of income. Specifically, developed countries benefit more from total capital flows than emerging market countries do. Second, total capital inflows have a positive effect on growth for emerging market countries, but not for developed ones. Lastly, capital outflows play opposite roles in the financial integration-growth nexus for developed countries and emerging market countries. Developed countries seem to take advantage of capital outflows, while emerging markets that lack capital are harmed by them.

When further breaking down the components of total capital flows into four categories, I find out that FDI is responsible for the positive and significant effect of inflows on growth in emerging market countries, while portfolio inflows do not have significant effects on growth for all three country groups. Meanwhile, FDI outflows do not have significant effects on growth for all three country groups, while portfolio outflows promote output gains only in developed economies. This result suggests that, for developed countries, portfolio investment outflows that serve the purpose of diversification can benefit these economies more than FDI outflows.

CHAPTER III

FINANCIAL INTEGRATION AND THE FINANCE-GROWTH NEXUS

Introduction

Recent cross-country investigations of the finance-growth nexus show that financial development is an important determinant of long run economic growth (Levine, 2000, 2003; Rousseau, 1998, 2000). However, the effect of financial integration on growth is still ambiguous. Edison (2002) argues that "the financial integration does not accelerate economic growth, even when controlling for particular economic, financial institutional, and policy characteristics." On the other hand, by reexamining some of the previous studies Quinn and Toyoda (2008) show that capital account liberalization promotes growth in both developed and developing countries.

Rajan and Zingales (2003) propose an interest group theory, which predicts that the incumbents could fight against financial development. However, this opposition will be ameliorated when an economy has both an open trade market and capital market. They suggest that neither trade openness alone nor capital market openness alone is likely to successfully promote financial development. The contribution of this theory in Rajan and Zingales is important, but the evidence is limited. Due to a limited availability of data they include only the twenty-four mostly industrialized countries in their analysis. It thus is impossible for them to take full advantage of the time series model and panel data model in explaining the impact of openness on financial development. Utilizing panel data and dynamic estimation techniques, Demetriades (2008) investigates the relationship

among trade openness, financial market openness and financial development. Demetriades reach the conclusion that both types of openness foster financial development, a finding which is consistent with the hypothesis in Rajan and Zingales (2003). However, he suggests that opening one market without the other will not necessarily have a negative impact on financial sector development, which is a conclusion not shared by Rajan and Zingales.

The findings that financial development influences economic growth bring out a new question: Why do countries vary across the degree of financial development? Rousseau and Wachtel (2011) find that the finance- growth nexus in the recent period is not as strong as in the 1960-1989 periods. One possible reason they suggest for this change is the global liberalization in the 1980s since it could have lead to rapid financial development in countries that lacked a well-established financial system to regulate the cross-country financial flows. It is important to note that economic development and financial institutions can affect the influence of financial development on growth. The efficiency of the financial system in richer countries is relevant to economic growth. For this reason, some studies distinguish developed and developing countries when examining the finance-growth nexus.

Macroeconomic indicators, such as the inflation rate, budget deficits, the exchange rate and the quality of the institution, also have an important impact on the link between financial development and growth. Rousseau and Yilmazkuday (2009) examine how inflation rate affects the finance-growth nexus. Using both an econometric and a graphical method, they reach the conclusion that a combination of a higher level of

financial development and a lower inflation rate is associated with rapid economic growth.

Inspired by those previous studies, this paper examines the effect of financial integration on the link between financial development and growth using the rolling window technique. The rolling window method shows the entire evolutionary process of the nexus based on the level of financial integration, rather than the threshold alone. I find that financial development promotes economic growth when there is a moderate amount of financial integration. The effect of financial integration on the finance-growth nexus leads to further examination of financial development and financial integration in the second part of this paper.

Acemoglu et al. (2001, 2004) put forward the economic institutions hypothesis, which proposes that the existence of the economic institutions that help protect property rights are the fundamental cause of the differences in economic development. Another stream of literature led by the work of La Porta et al. (1997) proposes that "deeper" fundamentals, such as a nation's legal origin and the quality of its law enforcement, can affect financial development. They distinguish countries on the basis of their legal origins into four categories: the English common law tradition, and the French, German and Scandinavian civil law tradition. English common law is first created by judges and later incorporated into legislature. On the other hand, French, German and Scandinavian civil law are mostly made by scholars and legislators. Among the four legal origins, English common law is considered to provide the best protection for both shareholders and creditors. French law is the most rigidly codified and thus provides the least protection. The protection provided by German civil law and Scandinavian civil law lies somewhere

between English common law and French civil law. Using the data from 49 countries, La Porta et al. (1997) reaches the conclusion that the countries with better legal investor protection and better law enforcement, i.e., English common law, have relative larger and broader capital markets. Levine (1998) also assesses the effect of legal origin on financial redevelopment, and finds that legal origin influences economic growth by forming the economy's financial system.

Bordo and Rousseau (2006) add a nation's political environment into the economic institution hypothesis by including it into the deep fundamental conditions which could affect economic development. They analyze how deep fundamentals, such as legal origins and political environment, impact the development of finance and growth with a cross-section dataset for the period 1880-1997. Their conclusions about the relationship between a country's legal origin and financial development are largely consistent with La Porta et al. (1997). However, they consider the relationship as less persistent than in the La Porta et al. framework. They find that "proportional representation election systems, frequent elections, universal female suffrage, and infrequent revolutions or coups seem linked to larger financial sectors and higher conditional rates of economic growth" (Bordo and Rousseau, 2006).

Beck and Levine (2002) empirically examine the two channels through which legal origin impacts finance. The "political" channel stresses that legal traditions vary in terms of the priority right that different nations assign to private property. In contrast, the "adaptability" channel emphasizes that legal traditions vary in the nation's ability to adapt to changing conditions. The empirical results from both historical comparisons and cross-section regression support the "adaptability" channel.

Based on previous studies, this article examines the joint effect of legal and political factors on financial development and financial integration, respectively. An economy's financial development and financial integration are different but related in that the deep fundamental conditions of a nation, such as legal origin and political factors, have an effect on both financial development and financial integration. However, as argued in the literature, they may have different effects on growth.

The rest of the article is organized as follows. Section 2 and 3 describe the data and the method used to analyze the data. Section 4 examines the effect of financial integration on the link between financial development and growth. Section 5 explores the joint effects of legal origin and political factors on financial development and financial integration, respectively. The conclusion and summary are provided in Section 6.

Data

To study the relationship among economic growth, financial integration and financial development, I use per capita real gross domestic product (GDP) to measure economic performance. In this chapter the stock of liquid liabilities (M3) divided by GDP, which reflects the size of the economy's banking system, is used as the measure of financial development. Because M3 is the most common measure of financial development, it allows me to focus primarily on the effect of financial integration on the link between financial development and growth. Both real GDP per capita and M3 are continuously available from the World Bank's *World Development Indicator* for all 50 countries in the sample for the period 1960-1997.

The complicated issue in financial integration literature is, of course, measuring the extent of integration. Among a wide array of possibilities, two major proxies are used: 1) government restrictions on capital flows and 2) measures of actual international capital flows. The IMF's measure of restrictions on openness provides an indicator of governmental restrictions on international financial transactions that is a zero-one dummy. Another is Dennis Quinn's measure, which is an improvement on the IMF's measure. By reading through formal capital account restrictions, he assigns scores to each country. Quinn's measure is available, however, only for selected years and countries. Although the IMF's measure and Quinn's are direct proxies for governmental impediments, they do not measure the magnitude of financial integration. On the other hand, actual capital flows are good measures of financial integration since they capture the extent of an individual country's connection to the international financial markets. Another advantage of capital flows is that they are incremental variables and fluctuate over time. For many empirical studies, including mine, actual capital flows are more suitable measures. For instance, some African countries have very few restrictions on capital account openness and would be considered as open economy according to the IMF's measure, yet actual capital flows into those countries are small. Another example is China, where there are extensive restrictions on cross-country capital flows, but actual flows are quite large. This paper therefore uses actual international capital flows as proxies for financial integration.

The five measures used in this paper are: 1) the total flows of capital, which accumulate inflows and outflows for both FDI and portfolio investments; 2) the total inflows of capital, which are the sum of FDI and portfolio inflows; and 3) the total outflows of capital, which comprise FDI and portfolio outflows; 4) the total FDI, which

are the sum of FDI inflows and FDI outflows (i.e., FDI received by domestic countries and domestic countries' direct investment in foreign countries); 5) the total portfolio investments, which reflect the sum of portfolio debt investment and portfolio equity investment (i.e., foreign countries' portfolio investment in domestic countries and domestic countries' portfolio investment in foreign countries). I obtained the data for FDI and portfolio investment flows from the IMF's *International Financial Statistics* (IFS), measured in current U.S. dollars. To remove the effect of inflation, all measures are reported as a percentage of GDP per capita. The control variables I include in the subsequent regressions, such as the inflation rate, the log of secondary school enrollment rate and the log of initial level of real GDP per capita, are all taken from World Bank's *World Development Indicators*.

The countries' legal origins are taken from Levine-Loayza-Beck Dataset, *Finance and the Sources of Growth* and *Financial Intermediation and Growth* (2000). The countries with an English common law tradition are Australia, Canada, Ghana, India, Ireland, Israel, Jamaica, Malaysia, New Zealand, Nigeria, Pakistan, Singapore, South Africa, Sri Lanka, Thailand, United Kingdom, United States and Zimbabwe. Countries with a French civil law tradition are Argentina, Belgium, Brazil, Chile, Colombia, Costa Rica, Ecuador, Egypt, France, Greece, Indonesia, Italy, Mexico, the Netherlands, Paraguay, Peru, the Philippines, Portugal, Senegal, Spain, Turkey, Uruguay and Venezuela. The countries with a German civil law origin are Austria, Germany, Japan, Korea and Switzerland. Denmark, Finland, Norway and Sweden have a Scandinavian legal origin.

Political instability reflects the uncertainty of the future investment return, which can decrease or slow down the investment, thus affecting financial depth and reducing capital flow. The variables reflecting the political environment are from the dataset compiled by Leblang (2003, 2004). Because of the availability of this dataset, I limit my analysis to the period 1960-1997 for 50 countries. Leblang's database provides several different indicators of the political environment, such as: whether a country has a parliamentary system or a presidential system (A key difference between parliamentary and presidential systems lies in the separation of the powers between the executive and the legislative branches); whether a country employs a party-proportional representation voting-system; whether there is a single political party that legally holds effective power; whether there is universal female suffrage, i.e., whether women have the right to vote and to run for office; the number of elections in every year; and the number of revolutions or coups. Although all the indicators are not direct proxies for the political environment except the number of elections and the number of revolutions or coups, they are all related to finance and growth. Since this paper aims at examining the relationship among financial development, financial integration and growth, I include all of them in my analysis.

Five-year averages of the variables are used in the regressions. There are some advantages in using panel data and five-year averages. The averages can characterize the steady state relationship between growth and other explanatory variables. Panel data contains multiple observations for multiple periods, a situation that allows us to take advantage of both cross-sectional regression and time-series regression. With panel data, it is possible to control for some types of omitted variables, such as those that differ

between cases but are constant over time and those that vary over time but are constant between cases.

Methodology

Before applying the rolling window technique to examine the effect of financial integration on the finance-growth nexus, I use a series of OLS baseline regressions to investigate the relationship among growth, financial development and financial integration. The baseline growth regressions take the form:

$$y_{i,t} = \alpha + \beta F_{i,t} + \gamma X_{i,t} + \varepsilon_{i,t}, \quad (1)$$

where the dependent variable $y_{i,t}$ is the five-year average of the annual growth rate of real per capita GDP. $F_{i,t}$ is the five-year average of either liquid liabilities as a percentage of real GDP per capita or one measure of financial integration. $X_{i,t}$ represents a vector of control variables that are associated with economic growth. I include both the log of real per capita GDP and the log of secondary school enrollment rate at the beginning of each five-year period as the control variables in basic growth regressions. $\varepsilon_{i,t}$ is a random disturbance that approximates the normal distribution. Dummy variables for each five-year period are included in the regressions but not reported. The baseline financial development regressions take the following form:

$$FD_{i,t} = \alpha + \beta FI_{i,t} + \gamma X_{i,t} + \varepsilon_{i,t}, \quad (2)$$

where the dependent variable $FD_{i,t}$ is the five-year average of liquid liabilities as a percentage of real GDP per capita. $FI_{i,t}$ is the five-year average of one measure of financial integration. Again $X_{i,t}$ represents a vector of control variables, which is the log

of real per capita GDP and the inflation rate at the beginning of each five-year period in financial development regressions.

I then use the rolling window technique to examine the effect of financial integration on the link between financial development and economic growth. The rolling window method can capture the possible nonlinearities in the financial development coefficient in the growth regression. Thus, it generalizes the threshold method in previous studies by providing the entire evolutionary process of the coefficients. In this paper, all the observations are sorted according to the degree of financial integration. In each growth regression, liquid liabilities as a percentage of real GDP per capita and control variables, such as the log of initial real per capita GDP and the inflate rate, are included as independent variables. I start with 80 observations and then add one observation at a time until the full sample is included.

To investigate how "deeper" fundamentals, such as a nation's legal origin, the quality of the law enforcement and political environment affect finance, I first respectively examine whether the legal origin and political environment are correlated to financial development. With these results I then examine the joint effect of legal origin and political environment on financial development. The multiple regressions that combine the effect of legal origin with political variables take the following form:

$$\mathrm{FD}_{\mathrm{i,t}} = \alpha + \beta L_i + \theta P_{i,t} + \gamma X_{i,t} + \varepsilon_{i,t}. \qquad (3)$$

Again the dependent variable $\mathrm{FD}_{\mathrm{i,t}}$ is the five-year average of liquid liabilities. L_{i} is the legal origin for country i and $\mathrm{P}_{\mathrm{i,t}}$ represents a set of variables that reflect the political environment for country i at period t. $\mathrm{X}_{\mathrm{i,t}}$ is a vector of control variables, such as the log of real per capita GDP and the inflation rate at the beginning of each five-year

period. Similar multiple regressions are applied for different measures of financial integration:

$$\mathrm{FI}_{\mathrm{i,t}} = \alpha + \beta L_i + \theta P_{i,t} + \gamma X_{i,t} + \varepsilon_{i,t}. \quad (4)$$

After separately comparing the effect of legal origin and political environment on financial development and financial integration, I further investigate the role of the legal and political environment on the relationship between financial development and financial integration. Consider the following regression equation:

$$\mathrm{FI}_{\mathrm{i,t}} = \alpha + \beta FD_{i,t} + \gamma X_{i,t} + \varepsilon_{i,t}, \quad (5)$$

where control variable $\mathrm{X}_{\mathrm{i,t}}$ represents the log of real per capita GDP at the beginning of each five-year period. Two instrumental regressions are applied for comparison with the OLS regression. First, the contemporary five-year averages of liquid liabilities are instrumented with the initial values of the liquid liabilities for each five-year period. Secondly, the contemporary five-year averages of liquid liabilities are instrumented with legal origin and political variables. The dummy variables for each five-year period are included in the regression, but not reported. Comparison of the results from the two instrumental regressions implies the channel through which legal and political factors affect finance.

Financial Development, Financial Integration and Growth

The regression analysis includes standard explanatory variables such as the log of initial real GDP per capita, the log of initial secondary school enrollment and the inflation rate. Dummy variables for each five-year period are also included in the regressions, but not reported in the table. All the explanatory variables and the dependent variables are

five-year averages. I use the initial levels of the explanatory variables in order to reduce the simultaneous bias.

Table 8 reports the results of the base-line OLS growth regression. Each column reports the results from regressions including either M3 or one measure of financial integration, and other control variables. All initial values are measured at the start of each five-year period. The logs of the initial level of real GDP per capita have negative coefficients due to convergence. In the regression using broad money as an explanatory variable, the negative coefficient of the initial level of GDP is statistically insignificant. However coefficients of the initial level of GDP are statistically significant in all the other regressions in which measures of financial integration are respectively used as explanatory variables. The log of the initial level of secondary school enrollment rate for each five-year average, which reflects the nations' development of human capital, has a positive coefficient. The coefficients of all regressions with the financial integration measures are significant. The broad money supply M3 as the percentage of GDP has a positive statistically significant coefficient, which is consistent with the previous studies of the relationship between financial development and economic growth. On the other hand, all the measurements of financial integration have a statistically insignificant coefficient, which means there is no evidence that financial integration has an important influence on growth.

Table 9 reports the results of the OLS regression of financial development on financial integration. The inflation rate, measured as the average annual growth rate of the consumer price index (CPI) in each five-year period, has a negative effect on the broad money supply. In other words, a higher inflation rate can help reduce the broad

Table 8. OLS Growth Regression on Either Financial Development or Financial Integration, 50 Countries for 1960-1997

	M3 (% of GDP)	Total flow	Total inflow	Total outflow	Total FDI	Total Portfolio
Log of initial real per capita GDP	-0.238 (0.173)	-0.384** (0.174)	-0.380** (0.167)	-0.333** (0.175)	-0.372** (0.165)	-0.390** (0.169)
Log of initial school enrollment (%)	0.334 (0.416)	1.291** (0.428)	1.248** (0.426)	1.288** (0.427)	1.316** (0.424)	1.327** (0.426)
Initial level of M3 (% of GDP)	0.011* (0.006)					
Initial level of financial integration (% of GDP)		0.018 (0.058)	0.076 (0.089)	-0.061 (0.092)	-0.033 (0.090)	0.006 (0.046)
R square	0.098	0.108	0.107	0.109	0.112	0.109
No. Observations	247	243	247	243	245	244

Note: The table reports coefficients from OLS regression with standard errors in parentheses. The dependent variables are the five-year averages of annual growth rate of real per capita GDP. The log of real per capita GDP and log of secondary school enrollment rate at the start of each five-year period are included in the regression as control variables. Either measure of financial development or one measure of financial integration is included as explanatory variable in the regression. The measure of financial development and measures of financial integration are a percentage of real GDP per capita and are five-year averages from 1960 to 1997. Dummy variables for each five-year period are included in the regression but not reported. * and ** denote statistical significance at the 10 percent and 5 percent levels, respectively.

money supply. This situation occurs because a higher inflation rate can lead to difficulties in nominal contracting and then dampen financial development. All the measures of financial integration have positive coefficients, and four of them are statistically significant except the coefficient on total portfolio investment. These results mean that financial integration is related to financial development.

Table 9. OLS Regression of Financial Development on Financial Integration, 50 Countries for 1960-1997

	Total flow	Total inflow	Total outflow	Total FDI	Total Portfolio
Log of initial real per capita GDP	9.743** (1.336)	10.731** (1.279)	9.777** (1.331)	10.863** (1.255)	11.589** (1.297)
Initial level of inflation rate	-0.080** (0.030)	-0.089** (0.030)	-0.081** (0.030)	-0.088** (0.030)	-0.095** (0.030)
Initial level of financial integration (% of GDP)	2.016** (0.535)	2.1098** (0.822)	3.816** (1.011)	1.963** (0.728)	0.737 (0.577)
R square	0.380	0.356	0.380	0.356	0.347
No. Observations	228	232	228	230	229

Note: The table reports coefficients from OLS regression with standard errors in parentheses. The dependent variables are the five-year averages of liquid liabilities as percentage real per capita GDP. The logs of real per capita GDP, inflation rate and one measurement of financial integration as a percentage of real GDP per capita are included on the right hand of the regression. All the three independent variables are measured at the start of each five-year period from 1960 through 1997. Dummy variables for each five-year period are included in the regression but not reported. * and ** denote statistical significance at the 10 percent and 5 percent levels, respectively.

When the findings in table 8 and table 9 are combined, financial integration itself is shown not to have a significant effect on growth, despite being correlated to financial development. These results lead to the following question: How does financial integration affect the link between financial development and growth?

To assess this question, I apply the rolling window method to a dataset of 50 countries from 1960 to 1997. All the observations are sorted according to financial integration. Five-year averages are used; thus there are 8 observations for each country and in total 400 observations at most for each variable. Eighty observations are applied at the beginning and then one observation at a time is added until the full sample is included.

Since there are five different measurements of financial integration, I sorted all the observations according to these and respectively applied the rolling window OLS regression to each. For instance, all observations are ordered from the lowest to the highest total capital flows share. The first regression uses the data from first 10 countries (80 observations at most) of the ordered data set; the second regression uses a similar data range by moving the 80 window toward higher total capital flows share by one observation, and so on. The selection of the constant window is very significant since it can affect the cross-window comparison of the estimated coefficients. The window size of 80 in this paper provides a fair distribution of across the power of regressions. The results are robust to the selection of the window size as the results under different selections of window size are similar to the results here.

Figure 5 shows the results when total capital flows, as percentage of GDP, are used as the measurement of financial integration. The X-axis shows the average level of total capital flows share across the 80 observations, while the Y-axis shows the estimated coefficient of financial development on economic growth in each regression. The solid line gives the coefficients and the dotted line shows the standard error interval[4]. I find that for the countries with a very low percentage of total capital flows (total capital flow share below a 2 percent of GDP), the coefficients of financial development are positive most of the time, but not statistically significant. However, in the middle range of total capital flow shares, the coefficients become positive and statistically significant, which is evidence of the finance growth nexus. This relationship disappears among very high total capital flow share countries, since it is obvious that the coefficients are insignificant and even negative when total capital flow share above 5 percent of GDP. Financial

[4] The estimations results are showed in the appendix.

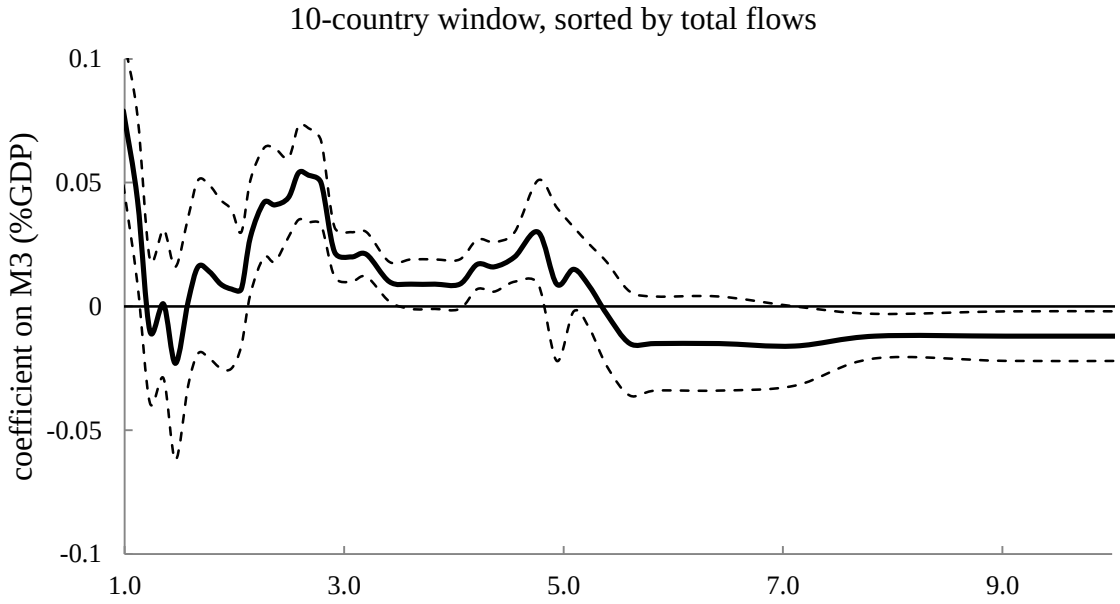


Fig. 5. Evolution of Financial Development Coefficients in a Rolling 10-Country Window Ordered by Increased Total Flows (%GDP), 1960-1997

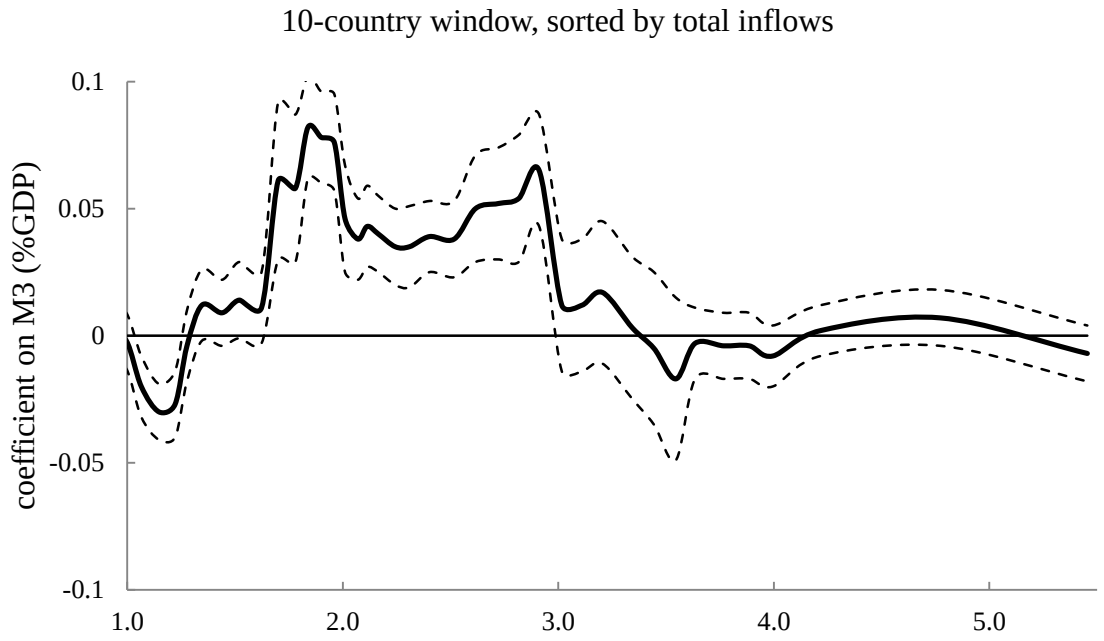


Fig. 6. Evolution of Financial Development Coefficients in a Rolling 10-Country Window Ordered by Increased Total Inflows (%GDP), 1960-199

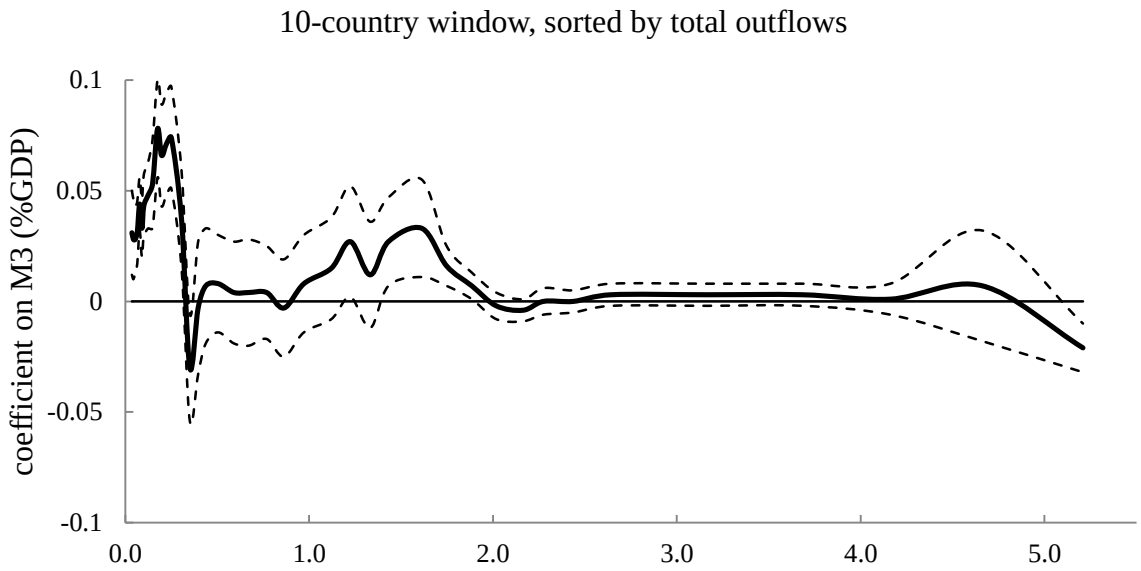


Fig. 7. Evolution of Financial Development Coefficients in a Rolling 10-Country Window Ordered by Increased Total Outflows (%GDP), 1960-1997

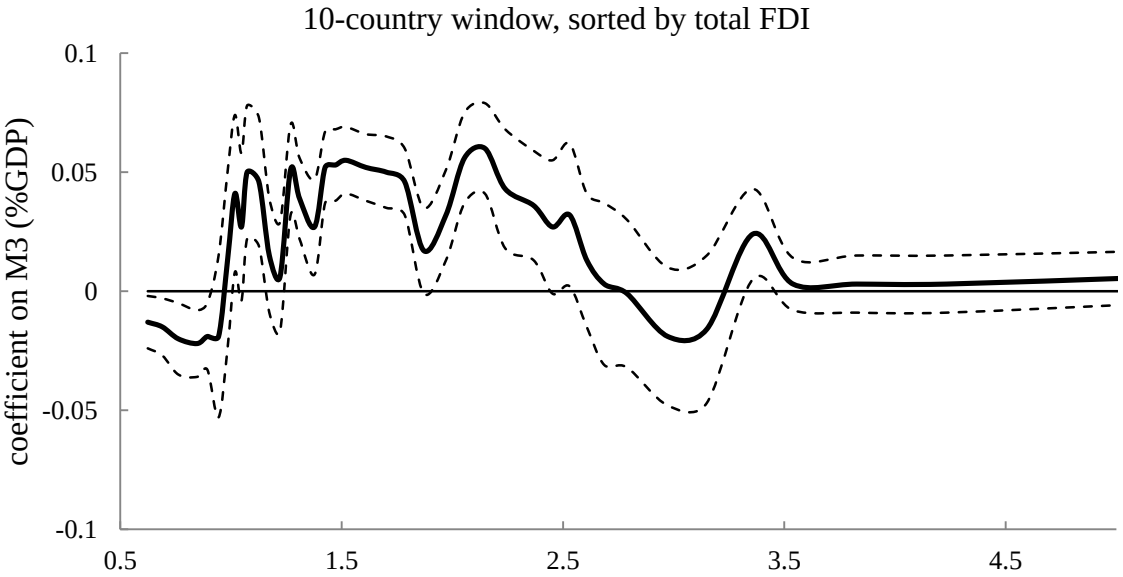


Fig. 8. Evolution of Financial Development Coefficients in a Rolling 10-Country Window Ordered by Increased Total FDI (%GDP), 1960-1997

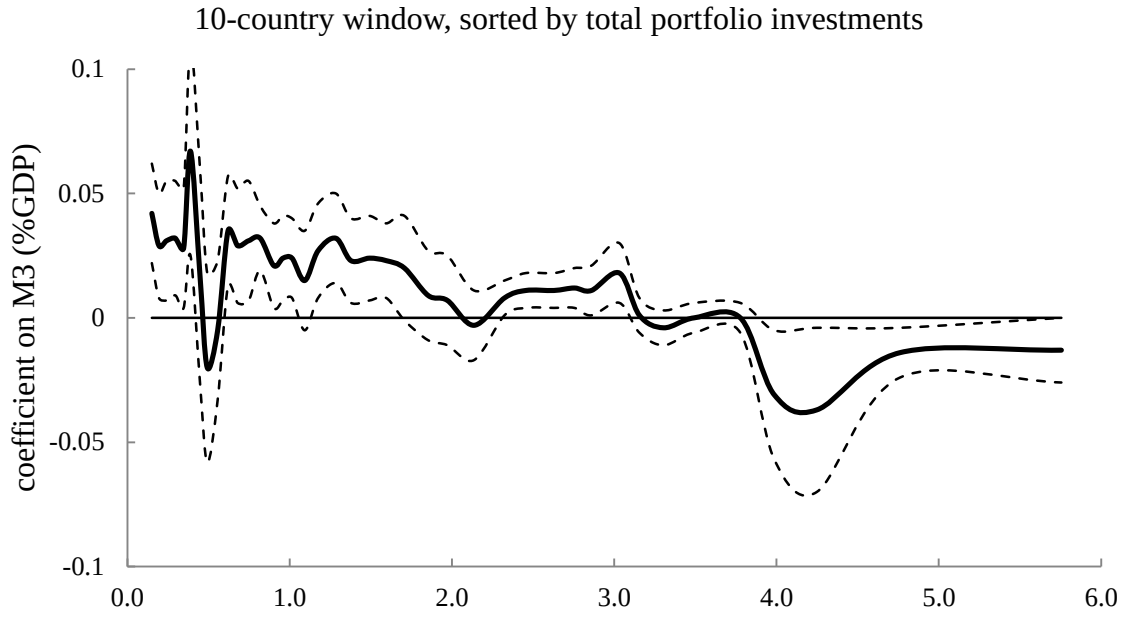


Fig. 9. Evolution of Financial Development Coefficients in a Rolling 10-Country Window Ordered by Increased Total Portfolio Investment (%GDP), 1960-1997

development promotes economic growth when there is a moderate amount of capital flows. Once there are excessive of capital flows, the benefit of finance development on growth disappears. Figure 6 to 9 show the rolling window regression results when total capital inflows, total capital outflows, total FDI and total portfolio investment are used as measures of financial integration. Similar results are obtained: Only a moderate amount of financial integration benefit the link between financial development and economic growth. The effect of financial integration on the finance-growth nexus requires further analysis of financial development and financial integration, which is presented in the next section.

Deep Fundamentals, Financial Development and Financial Integration

In this section, I explore the importance of deep fundamentals in fostering financial development and financial integration. The deep fundamentals considered in this paper are the legal origins and the political environment as mentioned in the previous section.

I use a baseline regression framework to assess whether legal origin and political variables are correlated to financial development, respectively. Financial depth, measured as ratio of broad money (M3) to GDP, is used as the dependent variable in all these OLS regressions. First, I examine the relationship between financial depth and the particular type of legal origin, with the results reported in table 10. The initial level of per capita real GDP, the initial level of inflation rate and dummy variables for each time period are included as basic explanatory variables. The first column reports the results for the basic regression. The second column reports results from the regression that includes basic explanatory variables along with civil legal origin as a dummy variable in the regression. The third column uses three legal origin dummies instead of civil legal origin in the regression. The initial values of real per capita GDP and the inflation rate are taken from the first year of each period. Dummy variables for each five-year period are not reported in the table. As in the results of La Porta et al. (1997), I find that the countries with a civil law origin have a lower level of financial development than those with an English common law origin. When three legal origin dummies, i.e., French, German, and Scandinavian legal origin, are included in the regression, the findings are different from the results in La Porta, yet consistent with the findings of Bordo and Rousseau (2006). Countries with a German legal origin outperform English, French and Scandinavian

Table 10. OLS Regressions of Financial Development on Legal Origins, 50 Countries for 1960-1997

Dependent variable:	M3 (% of GDP)	M3 (% of GDP)	M3 (% of GDP)
Log of initial real per capita GDP	11.240**	12.031**	10.505**
	(0.922)	(0.926)	(0.906)
Initial inflation rate	-0.094**	-0.081**	-0.065**
	(0.026)	(0.025)	(0.022)
Civil origin		-10.677**	
		(2.775)	
French legal origin			-14.909**
			(2.563)
German legal origin			26.160**
			(4.447)
Scandinavian legal origin			-22.590**
			(4.453)
R square	0.392	0.419	0.569
No. Observations	326	326	326

Note: The table reports coefficients from OLS regressions with standard errors in parentheses. The first column reports the results from basic regression including only control variables: the log of real per capita GDP and inflation rate at the start of each five-year period as independent variables. The second column reports results from the regression including control variables and civil legal origin as a dummy variable, while the third column reports the results from regression including control variables and three types of legal origin as dummies. The dependent variable is averaged over every five years for the period 1960-1997. Dummy variables for each five-year period are included in the regression but not reported. * and ** denote statistical significance at the 10 percent and 5 percent levels, respectively.

systems with our bank-based measure of financial depth. Further, countries with French and Scandinavian systems have less financial development than countries with the English legal system, as in La Porta et al. (1997).

Table 11 reports the relation between financial development and the political variables listed in the left-hand column. Financial development measured as the percentage of GDP is the dependent variable for all the regressions. In addition to constant, dummy variables for time and the single political variable, the right-hand side of each regression in second column includes the log of real per capita GDP at the start of each five-year period; the last column adds the inflation rate at the start of each five-year period into the control set. Among all the political variables listed in the left-hand column, the parliamentary or mixed system is correlated to a higher level of financial system, while the electoral systems based on proportional representation have a negative effect on financial development. Frequent elections (both contemporary and lag of number of elections) are positively related to financial depth. The number of coups (both contemporary and the lag of the number of coups) has a negative but statistically insignificant coefficient. Dummy variables indicating whether the government is under a single party majority and whether there is universal female suffrage have statistically insignificant coefficients, a situation which suggests that they do not have an important effect on financial development.

Based on the results in table 10 and table 11, table 12 reports the findings from a set of multiple regressions that combine legal origin with political variables. Once again, the dependent variable is financial development. Four political variables, a dummy variable indicating whether the government is based on a parliamentary or a mixed system, the number of elections, the number of coups and a dummy variable representing whether the government is under a single party majority, are used in the regressions. The selection of the political variables is based on the results in table 11 and previous studies

Table 11. OLS Regressions of Financial Development on Individual Political Variables Respectively, 50 Countries for 1960-1997

Dependent variable:	M3 (% of GDP)	M3 (% of GDP)
Parliamentary or mixed system	19.532**	17.538**
	(3.050)	(3.191)
Proportional representation electoral system	-10.474**	-12.881**
	(3.487)	(3.517)
No. of elections	23.626**	22.887**
	(8.271)	(8.259)
No. of coups	-25.961	-23.133
	(25.672)	(25.846)
Lag of elections	19.057*	18.748*
	(10.066)	(10.089)
Lag of coups	-33.691	-28.582
	(27.214)	(27.430)
Single party majority	3.499	4.494
	(3.268)	(3.299)
Universal female suffrage	-10.906	-9.338
	(7.103)	(7.050)

Note: The table reports coefficients and standard errors for the political variables from separate OLS regressions. Dependent variables are liquid liabilities as a percentage of real GDP per capita, and are averaged over every five years for the period 1960-1997. In addition to a constant, dummy variables for each time period and the single political variable are used as control variables. Regressions in second column also include the log of real per capita GDP at the start of each five-year period; regressions in the last column include both the log of real GDP per capita and inflation rate at the start of each five-year period. Dummy variables for each five-year period are included in the regression but not reported. * and ** denote statistical significance at the 10 percent and 5 percent levels, respectively.

(Bordo and Rousseau, 2006). The findings obtained here are robust to the results in table 10 and table 11. If civil law origin is included, countries with a civil law origin have a lower level of financial development than those with an English common law origin. When three legal origin dummies, i.e., French, German and Scandinavian legal origin, are included in the regression, countries with a German legal origin outperform English, French and Scandinavian systems with our bank-based measure of financial depth. Further, countries with French and Scandinavian systems have less financial development than countries with an English legal system. The parliamentary or mixed system and frequent elections are correlated to a higher level of financial system (the contemporary number of elections and number of coups are used in the regression; the results are robust when the lag of elections and the lag of coups are used).

The comparison of the sample of countries in this paper with those in Bordo and Rousseau (2006) reveals why I find countries with a French legal origin do not outperform financially. Bordo and Rousseau include only two Latin American countries with a French legal system: Argentina and Brazil. However, in this paper the Latin American countries with a French legal system are: Argentina, Belgium, Brazil, Chile, Colombia, Costa Rica, Ecuador, Egypt, Mexico, Paraguay, Peru, Uruguay, and Venezuela. Most of these countries today have low financial development as well as a low income level. Secondly, Bordo and Rousseau (2006) point out that country with a Scandinavian legal system experienced a reversal from being the most financially developed in 1880-1929 to the least developed in 1945-1990, which is consistent with the conclusion in this article that Scandinavian countries are least financially developed.

Table 12. OLS Regressions of Financial Development on Both Legal Origins and Political Variables, 50 Countries for 1960-1997

Dependent variable:	M3 (% of GDP)	M3 (% of GDP)
Log of initial real per capita GDP	9.877** (1.193)	9.513** (1.094)
Civil origin	-5.544* (3.178)	
French legal origin		-9.242** (3.227)
German legal origin		22.763** (4.639)
Scandinavian legal origin		-25.195** (4.794)
Parliamentary or mixed system	17.128** (3.232)	14.877** (3.208)
No. of elections	19.322** (7.794)	7.513 (7.000)
No. of coups	-12.572 (23.896)	-11.856 (21.063)
Single party majority	3.031 (3.055)	-0.421 (2.739)
R square	0.442	0.569
No. Observations	291	291

Note: The table reports coefficients and standard errors for OLS regressions. Dependent variables are liquid liabilities as a percentage of real GDP per capita, and are averaged over every five years for the period 1960-1997. Initial values of per capita GDP are measured at the start of each five-year period. Dummy variables for each five-year period are included in the regression but not reported. * and ** denote statistical significance at the 10 percent and 5 percent levels, respectively.

Table 13. OLS Regressions of Financial Integration on Legal Origins, 50 Countries for 1960-1997, One Legal Origin Dummy

Dependent variable:	Total flow	Total inflow	Total outflow	Total FDI	Total Portfolio
Log of initial real per capita GDP	1.789** (0.235)	0.752** (0.118)	0.996** (0.137)	0.567** (0.105)	1.205** (0.179)
Civil origin	-2.148** (0.668)	-1.442** (0.337)	-0.803** (0.389)	-1.210** (0.299)	-0.961* (0.510)
R square	0.374	0.358	0.317	0.305	0.287
No. Observations	269	271	269	269	270

Note: The table reports coefficients from OLS regressions with standard errors in parentheses. The dependent variable is one measure of financial integration as a percentage of real GDP per capita and is averaged over every five years for the period 1960-1997. The initial values of real per capita GDP are taken from the first year of each period. Dummy variables for each five-year period are included in the regression but not reported. * and ** denote statistical significance at the 10 percent and 5 percent levels, respectively.

Table 13 reports the regression results for all 50 countries with only one legal origin dummy. The dependent variables involve financial integration as a percentage of real GDP per capita and are averaged over every five years for the period 1960-1997. The initial values of real per capita GDP and dummy variables for each five-year period are included in the regression. For comparison, table 14 reports the regression results for all 50 countries with three legal origin dummies. The dependent variables and other explanatory variables are the same as in table 13. I find that countries with a civil law origin have a lower level of financial integration than those with an English common law origin for all the five measurements. Moreover, countries with French and German systems have less financial integration than English common law system countries for almost all the measures. On the other hand, countries with a Scandinavian system do not

Table 14. OLS Regressions of Financial Integration on Legal Origins, 50 Countries for 1960-1997, Three Legal Origin Dummies

Dependent variable:	Total flow	Total inflow	Total outflow	Total FDI	Total Portfolio
Log of initial real per capita GDP	1.814**	0.820**	0.944**	0.617**	1.162**
	(0.261)	(0.131)	(0.152)	(0.115)	(0.199)
French legal origin	-2.079**	-1.279**	-0.918**	-1.072**	-1.066*
	(0.709)	(0.355)	(0.413)	(0.314)	(0.542)
German legal origin	-2.655**	-2.378**	-0.320	-2.235**	-0.316
	(1.194)	(0.601)	(0.695)	(0.529)	(0.902)
Scandinavian legal origin	-1.965	-1.402**	-0.582	-0.831	-1.074
	(1.342)	(0.675)	(0.781)	(0.594)	(1.025)
R square	0.375	0.367	0.319	0.321	0.289
No. Observations	269	271	269	269	270

Note: The table reports coefficients from OLS regressions with standard errors in parentheses. The dependent variable is one measure of financial integration as a percentage of real GDP per capita and is averaged over every five years for the period 1960-1997. The initial values of real per capita GDP are taken from the first year of each period. Dummy variables for each five-year period are included in the regression but not reported. * and ** denote statistical significance at the 10 percent and 5 percent levels, respectively.

have less financial integration for almost all the measures. The French legal system, the most rigidly codified and providing the least protection of property rights, underperforms both the German and the Scandinavian systems for all the measures except total capital inflows.

As in table 11, table 15 reports the relation between financial integration and the individual political variables listed in the left-hand side column. The measures of financial integration are the dependent variable for all the regressions. In addition to a

Table 15. OLS Regressions of Financial Integration on Individual Political Variables, 50 Countries for 1960-1997

Dependent variable:	Total flow	Total inflow	Total outflow	Total FDI	Total portfolio
Parliamentary or mixed system	1.730**	0.769**	1.116**	0.923**	0.887
	(0.732)	(0.375)	(0.420)	(0.329)	(0.555)
Proportional electoral system	-1.238	-1.149**	-0.179	-1.481**	0.226
	(0.769)	(0.383)	(0.448)	(0.331)	(0.587)
No. of elections	-1.518	-1.064	-0.212	-1.572*	0.495
	(2.051)	(1.049)	(1.182)	(0.921)	(1.504)
No. of coups	4.901	0.040	4.456	-0.469	4.816
	(8.643)	(4.435)	(4.972)	(3.901)	(6.518)
Lag of elections	-1.977	-1.206	-0.268	-1.177	0.068
	(2.178)	(1.087)	(1.264)	(0.967)	(1.601)
Lag of coups	2.205	-0.147	2.171	-0.681	2.599
	(5.632)	(2.847)	(3.261)	(2.505)	(4.270)
Single party majority	0.196	0.234	-0.080	0.498	-0.454
	(0.706)	(0.361)	(0.407)	(0.317)	(0.532)
Universal female	1.285	1.080	0.157	1.020	0.277
	(1.678)	(0.859)	(0.967)	(0.755)	(1.268)

Note: The table reports coefficients and standard errors for the political variables from separate OLS regressions. The dependent variable is one measure of financial integration as a percentage of real GDP per capita and is averaged over every five years for the period 1960-1997. In addition to a constant, dummy variables for each time period, the log of real GDP per capita at the start of each five-year period, and the single political variable are used as explanatory variables. Dummy variables for each five-year period are included in the regression but not reported. * and ** denote statistical significance at the 10 percent and 5 percent levels, respectively.

constant, dummy variables for time and the single political variable, the right-hand side of each regression includes the log of real per capita GDP at the start of each five-year period. Among all the political variables listed in the left-hand column, the parliamentary

or mixed system is correlated to higher level of financial integration for most of measures, while the electoral systems based on proportional representation have a negative effect on total capital inflows and total FDI. Frequent elections (contemporary number of elections) are negatively related to total FDI. All the other political variables have statistically insignificant coefficients on financial integration.

Table 16 and table 17 report the findings from a set of multiple regressions that combine legal origin with political variables. The dependent variable is, once again, a measure of financial integration. Four political variables, whether the government is based on a parliamentary or a mixed system, the number of elections, the number of coups and whether the government is under a single party majority, are used in the regressions. Although the last two political variables are not significant in the previous regression, I keep them in the regression as they were important in earlier studies (Bordo and Rousseau, 2006). Table 16 includes civil legal origin as a dummy variable in the regression, while table 17 uses three legal origin dummies instead of civil legal origin in the regression. The findings are robust to the results in tables 13, 14 and 15. If civil law origin is included, countries with a civil law origin have a lower level of financial integration than those with an English common law origin. When three legal origin dummies, i.e., French, German and Scandinavian legal origin, are included in the regression, countries with French and German systems have less financial integration than English common law system countries for almost all the measurements. On the other hand, countries with Scandinavian systems do not have less financial integration for almost all the measures. The parliamentary or mixed system is correlated to higher level of financial integration only for some measures (the contemporary number of elections

Table 16. OLS Multiple Regressions of Financial Integration on Both Legal Origins and Political Variables, 50 Countries for 1960-1997

Dependent variable:	Total flow	Total inflow	Total outflow	Total FDI	Total Portfolio
Log of initial real per capita GDP	1.695**	0.745**	0.874**	0.559**	1.076**
	(0.282)	(0.143)	(0.164)	(0.125)	(0.216)
Civil origin	-1.880**	-1.389**	-0.553	-1.039**	-0.857
	(0.735)	(0.372)	(0.426)	(0.325)	(0.562)
Parliamentary or mixed system	1.114	0.293	0.947**	0.572*	0.616
	(0.776)	(0.392)	(0.450)	(0.343)	(0.594)
No. of elections	-2.134	-1.390	-0.539	-1.904**	0.210
	(2.024)	(1.023)	(1.174)	(0.894)	(1.503)
No. of coups	4.403	-0.415	4.385	-0.944	4.864
	(8.505)	(4.308)	(4.931)	(3.758)	(6.503)
Single party majority	-0.181	0.004	-0.249	0.310	-0.650
	(0.703)	(0.355)	(0.407)	(0.310)	(0.537)
R square	0.380	0.361	0.330	0.326	0.293
No. Observations	263	265	263	263	264

Note: The table reports coefficients and standard errors from OLS regressions. The dependent variable is one measure of financial integration as a percentage of real GDP per capita and is averaged over every five years for the period 1960-1997. Initial values of per capita GDP are measured at the start of each five-year period. Dummy variables for each five-year period are included in the regression but not reported. * and ** denote statistical significance at the 10 percent and 5 percent levels, respectively.

Table 17. OLS Multiple Regressions of Financial Integration on Both Legal Origins and Political Variables, 50 Countries for 1960-1997

Dependent variable:	Total flow	Total inflow	Total outflow	Total FDI	Total portfolio
Log of initial real per capita GDP	1.743** (0.291)	0.796** (0.146)	0.872** (0.169)	0.600** (0.127)	1.079** (0.223)
French legal origin	-1.640** (0.805)	-1.131** (0.405)	-0.576 (0.467)	-0.811** (0.351)	-0.871 (0.616)
German legal origin	-2.618** (1.240)	-2.364** (0.624)	-0.313 (0.719)	-2.145** (0.541)	-0.409 (0.940)
Scandinavian legal	-2.185 (1.408)	-1.463** (0.709)	-0.772 (0.817)	-0.739 (0.614)	-1.455 (1.077)
Parliamentary or mixed system	1.310 (0.827)	0.496 (0.416)	0.937** (0.480)	0.736** (0.361)	0.630 (0.633)
No. of elections	-2.023 (2.036)	-1.237 (1.023)	-0.581 (1.182)	-1.723* (0.889)	0.086 (1.517)
No. of coups	4.539 (8.532)	-0.294 (4.295)	4.399 (4.951)	-0.878 (3.724)	4.946 (6.522)
Single party majority	-0.233 (0.722)	-0.021 (0.362)	-0.274 (0.419)	0.331 (0.315)	-0.718 (0.551)
R square	0.382	0.370	0.331	0.344	0.295
No. Observations	263	265	263	263	264

Note: The table reports coefficients and standard errors from OLS regressions. The dependent variable is one measure of financial integration as a percentage of real GDP per capita and is averaged over every five years for the period 1960-1997. Initial values of per capita GDP are measured at the start of each five-year period. Dummy variables for each five-year period are included in the regression but not reported. * and ** denote statistical significance at the 10 percent and 5 percent levels, respectively.

and number of coups are used in the regression; the results are robust when the lag of elections and the lag of coups are used).

In table 9, I show that financial integration has a positive effect on financial development for all the measures except total portfolio investment. However, I find the reverse effect in results reported in table 18. In addition to financial development, initial

Table 18. OLS Regressions of Financial Integration on Financial Development, 50 Countries for 1960-1997

Dependent variable:	Total flow	Total inflow	Total outflow	Total FDI	Total Portfolio
Log of initial real per capita GDP	1.237** (0.291)	0.580** (0.154)	0.606** (0.161)	0.305** (0.130)	0.913** (0.224)
Initial level of M3 (% of GDP)	0.026* (0.014)	0.005 (0.007)	0.021** (0.008)	0.014** (0.006)	0.013 (0.011)
R square	0.312	0.274	0.283	0.262	0.226
No. Observations	238	240	238	238	239

Note: The table reports coefficients from OLS regression with standard errors in parentheses. The dependent variable is one measure of financial integration as a percentage of real GDP per capita and is averaged over every five years for the period 1960-1997. Initial values of per capita GDP and liquid liabilities are measured at the start of each five-year period. Dummy variables for each five-year period are included in the regression but not reported. * and ** denote statistical significance at the 10 percent and 5 percent levels, respectively.

values of per capita GDP and dummy variables for each five-year period are used as explanatory variables. Financial development has a positive effect on three of the five measures of financial integrations.

Table 19 shows the results of instrumental regressions of financial integration on financial development. Financial development is instrumented with the initial values of the financial development for each five-year period as an instrument variable in the upper panel, while the lower panel uses legal origin and political variables as instrument variables (as listed in the first column in table 16). Civil law origin is used instead of three legal origins in order to avoid over identification. The dummy variables for each five-year period are included in the regression, but not reported. The coefficients of

Table 19. Instrumental Regressions of Financial Integration on Financial Development, 50 Countries for 1960-1997

Dependent variable:	Total flow	Total inflow	Total outflow	Total FDI	Total Portfolio
Log of initial real per capita GDP	1.248** (0.287)	0.583** (0.152)	0.615** (0.159)	0.311** (0.129)	0.919** (0.221)
M3 (% of GDP)	0.024* (0.013)	0.005 (0.007)	0.020** (0.007)	0.013** (0.006)	0.012 (0.010)
R square	0.316	0.276	0.284	0.263	0.229
No. Observations	238	240	238	238	239
Log of initial real per capita GDP	0.546 (0.476)	0.092 (0.257)	0.318 (0.261)	-0.068 (0.218)	0.550 (0.358)
M3 (% of GDP)	0.084** (0.034)	0.046** (0.018)	0.045** (0.019)	0.045** (0.016)	0.043* (0.025)
R square	0.261	0.182	0.245	0.171	0.202
No. Observations	234	236	234	234	235

Note: The table reports coefficients from instrumental regressions with standard errors in parentheses. The dependent variable is one measure of financial integration as a percentage of real GDP per capita and is averaged over every five years for the period 1960-1997. Initial values of per capita GDP are measured at the start of each five-year period. The upper panel reports the results from the regression using the initial values of the liquid liabilities for each five-year period as instrument variables. The lower panel reports the results from the regression using the legal origins and political factors as instrument variables. Civil law origin is used as a dummy instead of three types of legal origin dummy variables to avoid over identification. Dummy variables for each five-year period are included in the regression but not reported. * and ** denote statistical significance at the 10 percent and 5 percent levels, respectively.

financial development are larger and more statistically significant when legal origin and political environment are used as instrument variables. Those results confirm previous findings that financial integration and financial development are correlated. Legal origin

and political environment affect both financial development and financial integration. Moreover, legal-political factors affect financial integration through the financial development channel.

Summary of the Chapter

Recent cross-country investigations of the finance-growth nexus show that financial development is an important determinant of long run economic growth. However, the effect of financial integration on growth is still ambiguous. This paper examines the effect of financial integration on the link between financial development and growth using the rolling window technique. I find that financial development promotes economic growth when there is a moderate amount of financial integration. Once there is excessive financial integration, the benefit of finance development on growth disappears. The effect of financial integration on finance-growth nexus leads to further studies on the relationship between financial development and financial integration.

Another branch of the literature investigates the role of deep institutional fundamentals, such as legal-political factors, in the process of financial development. Countries with poorer protection of property rights have less developed financial markets. Using data for 50 countries from 1960 to 1997, I examine the joint effect of legal origin and political environment on financial development and financial integration, respectively. I find that financial development is related to financial integration and they are driven by the same deep institutional fundamentals. Further, legal-political factors affect financial integration through the financial development channel.

Appendix

Table 20. Regression Results of GDP Growth on Financial Development in a Rolling 10-Country Window Ordered by Increasing Total Flows (%GDP), 1960-1997

Coefficient	Standard error	T statistics	No. observation	Total flows
0.079	0.030	2.575	52	0.988
0.043	0.034	1.276	52	1.117
-0.010	0.029	-0.365	53	1.230
0.001	0.030	0.043	53	1.353
-0.023	0.039	-0.584	53	1.462
0.002	0.034	0.063	53	1.578
0.016	0.035	0.456	53	1.669
0.014	0.035	0.411	53	1.773
0.009	0.034	0.256	53	1.875
0.007	0.032	0.221	59	1.975
0.007	0.023	0.297	59	2.063
0.028	0.023	1.245	59	2.146
0.042	0.022	1.860	59	2.269
0.041	0.023	1.784	59	2.367
0.044	0.016	2.860	58	2.493
0.054	0.019	2.899	58	2.585
0.053	0.019	2.817	58	2.675
0.050	0.017	2.852	58	2.789
0.022	0.010	2.286	58	2.913
0.020	0.010	2.007	57	3.066
0.021	0.009	2.402	57	3.204
0.010	0.008	1.197	53	3.412
0.009	0.010	0.966	54	3.610
0.009	0.010	0.927	51	3.826
0.009	0.010	0.916	52	4.054
0.017	0.010	1.787	46	4.213
0.016	0.010	1.626	40	4.369
0.020	0.010	1.910	40	4.554
0.030	0.021	1.421	40	4.769
0.009	0.031	0.296	39	4.937
0.015	0.017	0.888	39	5.092
0.008	0.017	0.485	43	5.237
-0.003	0.021	-0.159	43	5.392
-0.015	0.021	-0.709	46	5.604
-0.015	0.019	-0.815	46	5.837
-0.015	0.019	-0.815	46	6.416
-0.016	0.016	-0.995	50	7.109
-0.012	0.009	-1.400	50	7.836
-0.012	0.010	-1.185	50	9.027
-0.012	0.010	-1.155	46	10.193

Note: The table reports the coefficient, standard error, t statistics and number of observations for each regression in a rolling 10-country window. The last column reports the average level of total flows across 10 countries for each regression.

CHAPTER IV

EQUITY MARKETS AND ECONOMIC GROWTH

Introduction

The rapid growth of equity markets in both emerging and developed markets in recent years has prompted both economists and policymakers to pay more attention to their impact on growth. It is widely accepted that financial development plays a potentially important role in long run growth. Many important theoretical and empirical studies have offered detailed argument and evidence for the role of finance in accelerating economic growth, such as those of Joseph Schumpeter (1912), Goldsmith (1969) and McKinnon (1973). Financial intermediaries, markets and institutions can provide the services to ameliorate transactions and information cost, facilitate risk management, mobilize savings and monitor managers, and thus can promote technological innovation and economic growth. The literature offers a key insight for understanding the effect of finance on growth. In particular, it suggests two different channels through which finance affect growth. The first one is the "total factor productivity" channel, which emphasizes the role of efficient resource allocation. Innovative financial instruments can ameliorate informational asymmetries, help monitor the manager and ease risk management, and then accelerate growth. The second is the "factor accumulation" channel, which stresses the role of capital accumulation. Financial intermediaries encourage savings and investment, improve the allocations from savings to productive investment, and take full advantage of resources.

In the empirical literature, the econometric approaches used to examine the relationship between finance development and economic growth can be classified into three groups: pure cross-section analysis, panel data techniques that use information from both cross-section and time-series dimensions, and microeconomic studies that use industry-level data or firm-level data. King and Levine (1993) applied cross-section growth regression on data from 80 countries over the 1960-1989 periods and concluded that countries with better-developed financial institutions grow faster than those with less-developed financial institutions. They also find evidence that the degree of financial development can predict future economic growth and the rate of capital accumulation. However, pure cross-section studies did not establish a causal relationship between finance development and long-run growth, and the results from cross-section studies may be undermined by simultaneity bias, omitted variables and unobserved country-specific effects.

Time series analysis for individual countries (for example, Jung 1986) is an alternative econometric method being used to examine the causal relationship between finance and growth. Rousseau and Wachtel (1998) examine the effect of finance on growth in five industrialized countries with the VAR method and vector error correction model (VECM). Using historical data (1879-1929), they found support for the leading role of financial intermediaries in output growth. Generalized method of moments (GMM) dynamic panel estimators, developed by Arellano and Bond (1991) and Arellano and Bover (1995), present a popular method used to deal with the bias induced by unobserved country-specific effects and the endogeneity of the explanatory variables when analyzing the link between finance and growth in recent literature. Levine, Loayza

and Beck (2000) applied both traditional cross-country growth regressions and the GMM dynamic panel techniques on 74 countries for the period from 1960 to 1995. They argued that the two methods provide consistent results: financial developments have positive effects on real sector growth.

The financial system consists of banks, non-bank financial institutions (such as an insurance company) and stock markets. The stock market allows companies to issue and publicly trade shares at a given price, which is another important source, other than the bank system, from which companies can obtain external funds. The most important advantage of investing in the stock market is the liquidity: the investors and entrepreneurs have the ability to sell the securities quickly and easily. Financial services provided by stock markets are different from the services provided by banks. Well-developed stock markets can help allocate capital more efficiently, diversify risks, reveal information in the public market and ameliorate the problems correlated to excessively powerful banks. For instance, powerful banks can impede competition and innovation by colluding with firm managers or protect established firms (Hellwig, 1991; Rajan, 1992). Thus, equity markets can help reduce the inefficiency related to powerful banks. Levine and Zervos (1998) extended their studies by including the stock markets in the analysis of the relationship between financial development and growth. Using the cross-country regressions for a set of 47 countries from 1976 through 1993, they investigate the effect of both stock markets and bank sectors on growth. They concluded that both stock market liquidity and banking development benefit economic growth. In other words, stock markets have a significant effect on growth even when entering regressions together with

banking development, which implies that stock markets and the bank sector provide different financial services.

Again, since the cross-section regressions did not take into account the potential simultaneity bias and unobserved country-specific effects, GMM dynamic panel estimators are applied to resolve some of the econometric weaknesses in recent studies. Rousseau and Wachtel (2000) apply the GMM method within the tri-variate vector augoregression models on 47 countries with annual data for 1980-1995. They found support for the leading roles of stock market liquidity and financial intermediaries on growth. The size of stock market, in particular, measured as market capitalization, has a less important role on output than the liquidity of the stock market, measured as the total value traded. Those findings are consistent with the results in Ross Levine and Zervos (1998).

Inspired by previous cross-country and dynamic panel analysis, this paper has applied the panel data VAR, with an adaptation of the GMM technique developed by Arellano and Bond (1991) and Arellano and Bover (1995) to examine the relationships among bank sectors, stock markets and economic growth. The dataset used in both Levine and Zervos (1998) and Rousseau and Wachtel (2000) ends in 1995, prior to the Asian financial crisis. Rousseau and Wachtel (2011) found that the effect of financial development on growth in more recent data (1990-2003) is not as strong as it was in the previous period (1960-1989). They also pointed out two possible explanations: excessive financial development and widespread financial liberalizations. However, they examined only the effect of bank sectors on growth. This paper investigates the role of both stock markets and bank sectors in growth based on a larger and more recent dataset of 63

countries over the period 1990-2005. The empirical results in this paper suggest that bank sectors do not have a positive effect on growth in the recent dataset, which is consistent with the findings in Rousseau and Wachtel (2011). However, stock market liquidity still has a positive and significant effect on growth when the total value traded is used as the measure. The other three measures of equity market development, including market capitalization, which measures the size of stock markets, do not have significant effects on growth. The findings imply that the liquidity of the stock markets is more important than the size of the market in accelerating economic growth. When these results are compared with the findings in Rousseau and Wachtel (2000), with a dataset covering the years 1980-1995, I find that the effect of stock market liquidity on growth is stronger in the recent period than in the previous period 1980-1995.

The remainder of the paper is organized as follows. Section 2 introduces the data and the measures used to capture the development and characteristics of bank sectors and stock markets. Section 3 describes the econometric methodology applied. Section 4 reports the empirical results from the VAR models. The conclusion and summary are presented in Section 5.

Data and Measures of Equity Markets

To examine the relationship among economic growth, financial intermediaries and equity markets, I use per capita real gross domestic product (GDP) to measure economic performance. I also choose the most commonly used measure of bank sector development, namely the stock of liquid liabilities (M3). This selection allows me to focus primarily on the growth effects of several different measures of equity markets.

Both real GDP per capita and M3 are continuously available for all 63 countries from the 2010 edition of World Bank's *World Development Indicators*.

The complicated issue in the literature is, of course, measuring stock market development. Among a wide array of possibilities, the following four measures are used in this paper: market capitalization, the total value traded, listed domestic companies and the turnover ratio. Market capitalization represents the total market value of a given country's outstanding shares, which equals the product of the share price and the number of shares outstanding (shares that have been authorized, issued and purchased by investors) for all stocks traded. The total value traded refers to the total value of shares traded in a given country, which equals the product of market price and the number of traded shares. The term "listed domestic companies" refers to the total number of companies (that are domestically incorporated, according to the definition from *World Development Indicators*) listed in a given country's stock market. The turnover ratio is another measure of development of the equity market, which equals the ratio of total value of shares traded during a period and the average market capitalization for that period. Market capitalization and listed domestic companies reflect the size of the equity market. The total value traded reflects two aspects of the stock market: size and liquidity. The turnover ratio measures the share liquidity. Liquidity is particularly important in stock markets. The ability to sell the equity easily and quickly can help build investor confidence and thus attract more investment for the domestic country. Based on liquidity and its interaction with market size, the total value traded is regarded as the best measure of stock market development.

However, there is one potential problem in measuring stock market activity: both market capitalization and the total value traded increase when the local share price increases. For instance, stock price increases largely when the market anticipates a large profit. This price rise will affect the level of both market capitalization and the total value traded, without any change in the number of shares outstanding, the number of shares traded or the transaction costs. In other words, the size and the liquidity of the equity markets, or the financial depth, will not change with the increase in stock prices. One way to deal with the influence of the stock price effect is to deflate these two measures with the U.S. dollar-equivalent local share price indexes for individual country[5]. Such deflation is particular important since it can filter the effect of the "forward-looking" stock prices. For comparison, the turnover ratio, which is another measure of liquidity of stock market and will not be affected by the price effect, is also included in the analysis.

Another potential problem with the measures of stock market and financial intermediaries is that growth may be correlated to those measures. I apply the GMM method within panel data VAR systems to ameliorate these endogeneity problems.

Market capitalization, the total value traded, listed domestic companies and the turnover ratio data are taken from the 2010 edition of World Bank's *World Development Indicators* for all 63 countries. Market capitalization and the total value traded are measured in current U.S. dollars. To express these two measures in real terms, I deflated them with the US dollar-equivalent local share price indices for individual countries. The local share price indexes for all the 63 countries are taken from the International Finance Corporation's (IFC) *Global Stock Markets Factbook (Or Emerging Stock Markets*

[5] According to Rousseau and Wachtel (2000), U.S. dollar-equivalent local share price indexes are a better deflator than the general price level such as the GDP deflator.

Factbook before 2001), and the exchange rates for each individual country are from the *Economist Intelligence Unit (EIU).* Thus, in the resulting panel VARs, I use real value in per capita terms. The selection of countries and time periods is based on the availability of data from the World Bank's *World Development Indicators* and the International Finance Corporation's (IFC) *Global Stock Markets Factbook.*

Previous empirical studies (Levine and Zervos, 1998; Rousseau and Wachtel, 2000) suggest that both financial intermediaries and stock market have positive effects on growth. This paper focuses only on the effects of different measures of equity markets by applying the VAR model to a more recent and wider dataset. 63 countries are included in the dataset and the period analyzed here is 1990 to 2005[6].

Methodology

The econometric method used to assess the relationships among economic growth, financial intermediaries and equity markets is panel data VAR, with an adaptation of the GMM technique developed by Arellano and Bond (1991) and Arellano and Bover (1995).

There are clear advantages in using panel data, which contains multiple observational units for multiple periods, allowing us to take advantage of information available in both the cross section and time series, especially when the time dimension is relatively small. Most of the recent empirical studies in the growth literature take non-

[6] The 63 countries are Argentina, Australia, Austria, Bangladesh, Belgium, Brazil, Bulgaria, Canada, Chile, China, Colombia, Cote d'lvoire, Czech Republic, Denmark, Ecuador, Egypt, Finland, France, Germany, Ghana, Greece, Hungary, Iceland, India, Indonesia, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kenya, Republic of Korea, Lebanon, Luxembourg, Malaysia, Mauritius, Mexico, Morocco, the Netherlands, New Zealand, Nigeria, Norway, Pakistan, Panama, Peru, the Philippines, Poland, Portugal, Romania, Singapore, South Africa, Spain, Sri Lanka, Sweden, Switzerland, Thailand, Trinidad and Tobago, Turkey, United Kingdom, United States, Vietnam and Zimbabwe.

overlapping, five-year averages or ten-year averages of annual data. The average can characterize the steady state relationship between growth and other explanatory variables, but may filter out some potentially useful information contained in the annual time series. Further, five-year averaging also results in an 80 percent reduction of the number of observations. The time period under analysis in this paper is 1990 to 2005. 16 observations of annual data are used; however, there are only 3 five-year averages observations. The system GMM method further decreases the number of time series observations available for the estimation since the differences and lags of the variables are involved. To maximize the use of the time and cross-country dimensions of available data sets, I therefore use a panel with annual data.

In a panel of N countries for T years, the tri-variate vector autoregressions with fixed effects take the form

$$y_{i,t} = \sum_{j=1}^{k} a_{1,j} y_{i,t-j} + \sum_{j=1}^{k} b_{1,j} m_{i,t-j} + \sum_{j=1}^{k} c_{1,j} s_{i,t-j} + \eta_{1,i} + \phi_{1,t} + \varepsilon_{1,i,t}, \quad (1a)$$

$$m_{i,t} = \sum_{j=1}^{k} a_{2,j} y_{i,t-j} + \sum_{j=1}^{k} b_{2,j} m_{i,t-j} + \sum_{j=1}^{k} c_{2,j} s_{i,t-j} + \eta_{2,i} + \phi_{2,t} + \varepsilon_{2,i,t}, \quad (1b)$$

$$s_{i,t} = \sum_{j=1}^{k} a_{3,j} y_{i,t-j} + \sum_{j=1}^{k} b_{3,j} m_{i,t-j} + \sum_{j=1}^{k} c_{3,j} s_{i,t-j} + \eta_{3,t} + \phi_{3,t} + \varepsilon_{3,i,t}, \quad (1c)$$

where $y_{i,t}$ is the measure of economic growth (real GDP per capita) for country i at time t, $m_{i,t}$ is real liquid liabilities per capita (M3), and $s_{i,t}$ is a measure of equity market development (market capitalization, the total value traded, listed domestic companies or the turnover ratio), η_i is a country-specific fixed effect, ϕ_t is a time-fixed effect, $\varepsilon_{i,t}$ is a random disturbance that approximates the normal distribution, and k is the lag order. I

assume that the error term $\varepsilon_{i,t}$ is orthogonal to the fixed and time effects as well as the lagged values of the endogenous variables, and that they are not serially correlated. I use the fixed effects model instead of random effects since η_i are likely to represent omitted country-specific characteristics that are correlated with the other explanatory variables. Time effects account for the trending behavior in the system variables.

As to the variables on the right hand side of equation (1), all the lagged values of the dependent variables are potentially endogenous. The presence of fixed effects in a data set with a small time dimension is also known to lead to biased estimates in the least squared dummy variable (LSDV) regression. However, system GMM estimation can ameliorate these problems. To carry out this strategy, I write the regression equation as a dynamic panel model, take the first-differences to remove unobserved time-invariant country-specific effects, and then instrument the independent variables using the predetermined lags of the system.

After taking first-differences, the first equation in the VAR (1a) becomes

$$(y_{i,t} - y_{i,t-1}) = \sum_{j=1}^{k} a_{1,j}(y_{i,t-j} - y_{i,t-j-1}) + \sum_{j=1}^{k} b_{1,j}(m_{i,t-j} - m_{i,t-j-1}) + \sum_{j=1}^{k} c_{1,j}(s_{i,t-j} - s_{i,t-j-1})$$

$$+ (\phi_{1,t} - \phi_{1,t-1}) + (\varepsilon_{1,i,t} - \varepsilon_{1,i,t-1}). \qquad (2)$$

The other equations in the VAR system can be similarly differenced. In equation (2), the country dummies have been differenced out, and the only remaining endogeneity problem is caused by correlation between the first lags of the system variables and the new error term $(\varepsilon_{i,t} - \varepsilon_{i,t-1})$. Under the assumption that the error term $\varepsilon_{i,t}$ is not serially

correlated, the *difference GMM* dynamic panel estimator uses the following moment conditions to deliver the coefficient estimates:

$$E[y_{i,t-j} \cdot (\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0, \qquad \text{for } j \geq 2; t = 3,.....,T, \tag{3}$$

$$E[m_{i,t-j} \cdot (\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0, \qquad \text{for } j \geq 2; t = 3,.....,T, \tag{4}$$

$$E[s_{i,t-j} \cdot (\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0, \qquad \text{for } j \geq 2; t = 3,.....,T. \tag{5}$$

There are statistical shortcomings with this first-difference GMM estimator. Alonso-Borrego and Arellano (1999) and Blundell and Bond (1998) show that persistent explanatory variables over time can make lagged levels weak instruments for the regression equations in differences. In small samples, such weak instruments can bias the coefficients. To reduce the potential biases and imprecision with the first-difference estimator, I use the system GMM estimator that combines the regression in differences with a regression in levels (Arellano and Bover, 1995 and Blundell and Bond, 1998). Lagged differences of the related explanatory variables are used as instruments for the regression in levels, while lags of the related explanatory variables are instruments for the regression in the differences shown above.

The additional moment conditions for the regression in levels are:

$$E[(y_{i,t-j} - y_{i,t-j-1}) \cdot (\eta_i + \varepsilon_{i,t})] = 0, \qquad \text{for j=1} \tag{6}$$

$$E[(m_{i,t-j} - m_{i,t-j-1}) \cdot (\eta_i + \varepsilon_{i,t})] = 0, \qquad \text{for j=1} \tag{7}$$

$$E[(s_{i,t-j} - s_{i,t-j-1}) \cdot (\eta_i + \varepsilon_{i,t})] = 0, \qquad \text{for j=1.} \tag{8}$$

Two types of tests are used to examine the consistency of the system GMM estimator. The first type includes the Sargan and Hansen tests of over-identification, which test the joint validity of the instruments by examining the moment conditions used

in the estimation.[7] The null hypothesis is that the instrument set is valid and that the model is not over-identified. The second type is the AR test, which examines whether there is serial correlation in the error terms. The test depends on large N and relatively small T, and has a null hypothesis of no serial correlation. I check for both first-order and second-order serial correlation.

Empirical Results

1. Economic Growth, Financial Intermediaries and Equity Markets

Treating market capitalization, the total value traded, the number of listed domestic companies and the turnover ratio as four different measures of equity markets development, I estimate four tri-variate VAR models. The results for these models are shown in table 21, table 22, table 23 and table 24, respectively. As mentioned in section 2, GDP and liquid liabilities are in per capita constant 2000 US dollars. Market capitalization and the total value traded are also in per capita terms and are deflated by US dollar-equivalent local share price indexes for each individual country.

To indicate the size and the direction of the causal effects, I report the coefficients on the k lags of each of the explanatory variables. Two lags are included in each VAR in this paper, and the selection of the number of lags is based on the results of a series of nested likelihood ratio tests. The Sargan test examines the joint validity of the instruments, and the AR tests examine the serial correlation of error terms. Those two tests together determine the consistency of the GMM estimators. Crucially, second-order serial correlation should be absent and the instrument set should not be over-identified.

[7] Only the results of Sargan tests are reported in this paper, since the Hansen test can be greatly weakened by the proliferation of instrument.

Table 21 reports the relationship among real GDP per capita, real liquid liabilities per capita and share price adjusted market capitalization per capita. The coefficients of the first two lags of each explanatory variable are reported, with the p-value in parentheses. Each column reports the results corresponded to equations (1a), (1b), and (1c) in section 3. The cumulative coefficients of liquid liabilities and market capitalization in the output equation are not significant. These suggest that both financial intermediaries and equity markets did not have significant effects on growth during the period 1990 to 2005. Although the effect of financial intermediaries on growth has been well-established in the empirical literature, Rousseau and Wachtel (2011) point out that the finance-growth nexus is weaker in recent data (1990-2003) than in the original data for the period 1960 to 1989. The result that liquid liabilities do not have a significant effect on growth is consistent with the findings in Rousseau and Wachtel (2011). P-values for the Granger causality test of each explanatory variable and Sargan tests are reported in the last four rows. The Sargan tests indicate that the instruments are valid and that the specifications are not over-identified. By construction, the differenced error term could be first-order serially correlated, while the second-order serial correlation should be absent. The AR (1) test has a p-value of zero and the AR (2) test has a p-value of 0.348 for output equation in table 21, an outcome that indicates that the results cannot be rejected due to the serial correlation problem.

Equation 2 and equation 3 use liquid liabilities (M3) per capita and market capitalization per capita as the dependent variables, respectively. Real GDP has a positive and significant effect on both liquid liabilities and market capitalization. These

Table 21. Panel System GMM Estimates for VAR with per Capita Real GDP, Liquid Liabilities (M3) and Market Capitalization, 1990-2005

	GDP	M3	MCAP
GDP_{-1}	1.1802**	-0.0606	0.0233
	(0.0000)	(0.8960)	(0.8740)
GDP_{-2}	-0.1581	0.1047	-0.0167
	(0.4930)	(0.8280)	(0.9120)
$M3_{-1}$	0.0591	0.9444**	-0.1688
	(0.6700)	(0.0000)	(0.2700)
$M3_{-2}$	-0.0637	0.0446	0.1689
	(0.6410)	(0.1890)	(0.2680)
$MCAP_{-1}$	-0.2581	1.6967**	0.6914**
	(0.7380)	(0.0030)	(0.0000)
$MCAP_{-2}$	0.0278	-1.6702**	-0.0646
	(0.8360)	(0.0000)	(0.7200)
AR (1)	0.0000	0.0610	0.2900
AR (2)	0.3480	0.6890	0.7420
Significance levels			
F-GDP	0.0000	0.0038	0.0514
F-M3	0.3820	0.0000	0.4932
F-MCAP	0.6933	0.0004	0.0000
Sargan test	0.4660	0.2370	0.8270

Note: The table reports coefficients from system GMM estimation for two lags of each system variable in a three-variable VAR, with the p-values in parentheses. The symbols * and ** denote statistical significance at the 10 percent and 5 percent levels, respectively. Each column corresponds to Equation (1a), (1b) and (1c) in the text. P-values for Granger-causality tests and the Sargan test are reported in the last four rows. Year dummies are included in the equations but are not reported. GDP and liquid liabilities are both in per capita constant 2000 U.S. dollars. MCAP (market capitalization per capita) is adjusted by US dollar equivalent local share price indices.

suggest the presence of feedback from GDP to the banking sector and stock market development. In addition, market capitalization has a positive and significant effect on liquid liabilities, while liquid liabilities do not have a significant effect on market capitalization. In other words, stock markets have a unidirectional effect on financial intermediaries. The stock market is a place where shares are issued and traded at an agreed price. Market capitalization, which equals the product of the share price and the number of shares outstanding for all stocks traded, is a measure of the size of the stock market. Market capitalization has a positive effect on liquid liabilities, an outcome meaning that countries with better development of stock markets also have more highly developed financial intermediaries. Since equation 2 and 3 also pass the specification tests, i.e., the Sargan test and AR tests, the system GMM estimator is consistent and the specification is valid.

In tables 22, table 23 and table 24, I repeat the analysis using total value traded, the number of listed domestic companies and the turnover ratio as the measure of stock market development, respectively. All three systems pass the specification tests defined above with only one exception, but that exception is a result that may weaken the findings in this paper.

In table 22, the cumulative effects of liquid liabilities on real GDP per capita are positive but not significant, while the total value traded has a positive and significant effect on GDP. The total value traded contains components of both the size and the liquidity of the equity market. These results suggest that, in the recent period of 1990 to 2005, the real sector might have benefited more from the equity market than from financial intermediaries. In addition, when the results are compared with the findings in

Table 22. Panel System GMM Estimates for VAR with per Capita Real GDP, Liquid Liabilities (M3) and Value Traded, 1990-2005

	GDP	M3	VT
GDP_{-1}	1.4311**	0.3435	-0.0500
	(0.0000)	(0.7230)	(0.8150)
GDP_{-2}	-0.4160**	-0.2996	0.0642
	(0.0000)	(0.7620)	(0.7710)
$M3_{-1}$	0.0216	0.9509**	-0.1353**
	(0.1050)	(0.0000)	(0.0000)
$M3_{-2}$	-0.0252*	0.0411	0.1336**
	(0.0680)	(0.2830)	(0.0000)
VT_{-1}	-0.3045**	-0.0808	-0.3052
	(0.0090)	(0.9430)	(0.4650)
VT_{-2}	0.3667**	-1.2483	0.5040**
	(0.0000)	(0.2730)	(0.0250)
AR (1)	0.0000	0.5430	0.0660
AR (2)	0.2100	0.9350	0.2420
Significance levels			
F-GDP	0.0000	0.0079	0.0324
F-M3	0.1285	0.0000	0.0006
F-VT	0.0000	0.0000	0.0626
Sargan test	0.8370	0.0760	0.2750

Note: The table reports coefficients from system GMM estimation for two lags of each system variable in a three-variable VAR, with the p-values in parentheses. The symbols * and ** denote statistical significance at the 10 percent and 5 percent levels, respectively. Each column corresponds to Equation (1a), (1b) and (1c) in the text. P-values for Granger-causality tests and the Sargan test are reported in the last four rows. Year dummies are included in the equations but are not reported. GDP and liquid liabilities are both in per capita constant 2000 U.S. dollars. VT (total value traded per capita) is adjusted by US dollar equivalent local share price indices.

Rousseau and Wachtel (2000) with a dataset covering the period of 1980-1995, I find that the effect of stock market liquidity on growth is stronger in the most recent period than in the previous period, 1980-1995.

According to the results from table 22, real GDP has positive and significant feedback on both liquid liabilities and the total value traded. As to the relationship between liquid liabilities and the total value traded, the latter has a negative effect on liquid liabilities, while liquid liabilities also have a negative and significant feedback on the total value traded. The stock market is one important channel for companies to raise additional capital for expansion by issuing ownership shares of the company. In recent decades, with the rapid development of equity markets, a large proportion of savings moved to the more risky stock market from the traditional banking deposits. The liquidity of equity markets allows investors to quickly and easily buy and sell securities, which is an attractive characteristic compared to other less liquid investment options, such as real estate. Equity market is a substitute for financial intermediaries with respect to both attracting savings and obtaining extra capital for firms. The total value traded, representing both size and liquidity of the stock market, has a negative effect on liquid liabilities. In other words, a more liquid equity market can attract more savings from the traditional banking sector and provide more capital for firms with financial constraint. In summary, the total value traded has a positive and significant effect on real GDP and real GDP has feedback on both liquid liabilities and the total value traded.

Tables 23 and table 24 present the results for the VAR systems with the number of listed domestic companies and the turnover ratio as the measure of equity market development, respectively. As in the previous analysis, two lags are included in each

Table 23. Panel System GMM Estimates for VAR with per Capita Real GDP, Liquid Liabilities (M3) and Listed Domestic Companies, 1990-2005

	GDP	M3	LC
GDP_{-1}	1.4259**	0.2970	-0.0262
	(0.0000)	(0.4030)	(0.2820)
GDP_{-2}	-0.4102**	-0.2677	0.0257
	(0.0050)	(0.4640)	(0.2920)
$M3_{-1}$	0.0214	0.9687**	0.0319
	(0.1820)	(0.0000)	(0.4840)
$M3_{-2}$	-0.0251	0.0259	-0.0314
	(0.1170)	(0.4510)	(0.4940)
LC_{-1}	-0.0809	-0.3091	1.2407**
	(0.1750)	(0.2410)	(0.0000)
LC_{-2}	0.0785	0.2883	-0.2437
	(0.1850)	(0.2900)	(0.1830)
AR (1)	0.0020	0.0490	0.0450
AR (2)	0.1870	0.7230	0.2220
Significance levels			
F-GDP	0.0000	0.0053	0.2731
F-M3	0.1810	0.0000	0.0842
F-LC	0.3887	0.3892	0.0000
Sargan test	0.2260	0.1220	0.8020

Note: The table reports coefficients from system GMM estimation for two lags of each system variable in a three-variable VAR, with the p-values in parentheses. The symbols * and ** denote statistical significance at the 10 percent and 5 percent levels, respectively. Each column corresponds to Equation (1a), (1b) and (1c) in the text. P-values for Granger-causality tests and the Sargan test are reported in the last four rows. Year dummies are included in the equations but are not reported. GDP and liquid liabilities are both in per capita constant 2000 U.S. dollars. LC represents the number of listed domestic companies.

Table 24. Panel System GMM Estimates for VAR with per Capita Real GDP, Liquid Liabilities (M3) and Turnover Ratio, 1990-2005

	GDP	M3	TR
GDP_{-1}	1.3970**	0.0369	-0.0085
	(0.0000)	(0.9470)	(0.3220)
GDP_{-2}	-0.3813**	0.0123	0.0090
	(0.0000)	(0.9830)	(0.3060)
$M3_{-1}$	0.0172	0.9210**	0.0007
	(0.2480)	(0.0000)	(0.1420)
$M3_{-2}$	-0.0213	0.0609*	-0.0009*
	(0.1480)	(0.0970)	(0.0930)
TR_{-1}	0.1239	1.1200	0.6859**
	(0.7810)	(0.2710)	(0.0000)
TR_{-2}	0.1266	-1.2452	0.2043**
	(0.7080)	(0.2120)	(0.0040)
AR (1)	0.0010	0.0600	0.0450
AR (2)	0.4800	0.4530	0.3730
Significance levels			
F-GDP	0.0000	0.0128	0.0396
F-M3	0.1313	0.0000	0.1767
F-TR	0.1929	0.4522	0.0000
Sargan test	0.5090	0.6050	0.7190

Note: The table reports coefficients from system GMM estimation for two lags of each system variable in a three-variable VAR, with the p-values in parentheses. The symbols * and ** denote statistical significance at the 10 percent and 5 percent levels, respectively. Each column corresponds to Equation (1a), (1b) and (1c) in the text. P-values for Granger-causality tests and the Sargan test are reported in the last four rows. Year dummies are included in the equations but are not reported. GDP and liquid liabilities are both in per capita constant 2000 U.S. dollars. TR represents turnover ratio.

VAR system. The coefficients on the lags of each explanatory variable are reported, with the p-values in parentheses. Again, both systems pass the Sargan and AR tests. Both the number of listed domestic companies and the turnover ratio do not have a significant effect on real GDP, while in these two VAR systems GDP has feedback on liquid liabilities. In addition, real GDP has a positive effect on the turnover ratio as shown in the regression results in table 24. In summary, I have compared the effect of the following four measures of stock market development: market capitalization, the total value traded, listed domestic companies and the turnover ratio. Only the total value traded has a positive and significant effect on real sector development. The total value traded is also regarded as the best measure of stock markets development as discussed in Rousseau and Watchel (2000).

2. Different Effects of Market Capitalization and Total Value Traded on Growth

To further compare the different effects of market capitalization and the total value traded, I use a four-variable VAR specification with real GDP per capita, real liquid liabilities per capita, share price adjusted market capitalization per capita and the total value traded per capita. Table 25 presents the results for the four-variable VAR system. As in the previous analysis, two lags are included in this VAR system. The cumulative coefficients of the two lags of each explanatory variable are reported, with the p-values of the joint significance tests for block exogeneity in parentheses. The results are consistent with the previous findings in tri-variate VAR systems. The total value traded continues to have a positive effect on real output at a one percent level, and market capitalization does not have a significant effect on output as in the tri-variate VAR. In other words, the results suggest that stock market liquidity is more important than stock market size in

Table 25. Panel System GMM Estimates for VAR with per Capita Real GDP, Liquid Liabilities (M3), Market Capitalization and Value Traded, 1990-2005

	GDP	M3	MCAP	VT
GDP	1.0161**	0.0112*	0.0062**	-0.0125
	(0.0000)	(0.0679)	(0.0480)	(0.5211)
M3	-0.0035	0.9984**	0.0003**	0.0025
	(0.1529)	(0.0000)	(0.0141)	(0.3267)
MCAP	-0.1485	0.3586**	0.7266**	0.6746**
	(0.7023)	(0.0019)	(0.0000)	(0.0002)
VT	0.0910**	-0.7130	-0.1427**	0.4990**
	(0.0000)	(0.2048)	(0.0003)	(0.0000)
AR (1)	0.0000	0.6330	0.1320	0.1790
AR (2)	0.2210	0.9700	0.8040	0.6190
Sargan test	0.7030	0.0920	0.1680	0.3210

Note: The table reports coefficients from system GMM estimation for two lags of each system variable in a four-variable VAR, with the p-values for Granger-casualty tests in parentheses. The symbols * and ** denote statistical significance at the 10 percent and 5 percent levels, respectively. Each column reports the results from one equation. P-values for the Sargan test are reported in the last row. Year dummies are included in the equations but are not reported. GDP and liquid liabilities are both in per capita constant 2000 U.S. dollars. MCAP (market capitalization per capita) and VT (total value traded per capita) are both adjusted by US dollar equivalent local share price indices.

promoting economic growth. These findings are consistent with the studies in Rousseau and Watchel (2000) for a set of 47 countries with annual data for the period 1980 to 1995. Although they find that both market capitalization and total value traded have a positive effect on growth in the tri-variate VAR model, the effect of market capitalization on growth is no longer statistically significant in the four-variable VAR system, including both the total value traded and market capitalization measures. The findings in this paper

further confirm the belief in Rousseau and Watchel, based on a larger and more recent dataset, that stock market liquidity is the channel through which the stock market affects growth.

Furthermore, output has a feedback on both liquid liabilities and market capitalization, a finding that is also consistent with previous results in tri-variate VAR systems. The coefficient of the value traded is negative and significant at a one percent level in equation 3, which suggests that the greater the liquidity of stock market, the smaller the total market value of a given country's outstanding shares. Liquidity liabilities have a positive and statistically significant effect on both market capitalization and the total value traded. Although financial intermediaries do not have a direct positive effect on growth, they may still influence growth through the equity market. The development of the banking sector is important for the stock market, especially at the early stage of development. For instance, at the establishment stage, the stock market can benefit from the support services of the banking sector. Stock markets, which allow investors to quickly and easily buy and sell securities, have become an important channel for companies to raise additional capital for expansion by issuing shares of company ownership. In recent decades, with the rapid development of equity markets, a large proportion of savings moved to the more risky stock market from the traditional banking deposits. Equity market is a substitute for financial intermediaries with respect to attracting savings. The results in this paper are also consistent with the views that equity markets provide different financial services from financial intermediaries and have independent impacts on growth.

Summary of the Chapter

Utilizing four different measures of equity market development for 63 countries for the time period of 1990 to 2005, and applying the panel data VAR model with an adaptation of the GMM method, I find that equity market development promotes real economic growth only when the total value traded is used as the measure. The other three measures of equity market development, however, do not have significant effects on growth.

To further compare the different effects of market capitalization and the total value traded, I apply a four-variable VAR specification with real GDP, real liquid liabilities, share price adjusted market capitalization and the total value traded. The results are consistent with the results in tri-variate VAR systems. The total value traded continues to have an effect on real output at a one percent level, and market capitalization does not have a significant effect on output. These findings imply that stock market liquidity is more important than the size of the market in accelerating economic growth. When these results are compared with the findings in Rousseau and Wachtel (2000) with a dataset covering the period of 1980-1995, I find that the effect of stock market liquidity on growth is stronger in the most recent period than in the previous period 1980-1995. On the other hand, the effect of stock market size on growth is not as significant as in the previous period. In addition, the total value traded has a negative and significant effect on market capitalization, an outcome suggesting that the greater the stock market liquidity, the smaller the total market value of a given country's outstanding share.

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