ADB Economics Working Paper Series

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No. 233 | November 2010

Asian Development Bank

ADB

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Abstract

Economic theory suggests that sound and efficient financial systems—banks, equity markets, and bond markets—which channel capital to its most productive uses are beneficial for economic growth. Sound and efficient financial systems are especially important for sustaining growth in developing Asia because efficiency of investment will overshadow quantity of investment as the driver of growth in the region. The data indicate that the region's financial systems have become deeper and more diversified since the early 1990s. A more formal econometric analysis on a panel data of 125 countries confirms that financial development has a significant positive effect on growth, especially in developing countries. The results also indicate that the impact of financial development on the region's growth is not noticeably different than elsewhere, and the impact has weakened since the Asian financial crisis. Overall, our evidence supports the notion that further development of the financial sector matters for sustaining developing Asia's growth in the postcrisis period. However, the primary role of financial sector development in growth is likely to shift away from mobilizing savings, thus augmenting the quantity of investment toward improving the efficiency of investment, and thereby contributing to higher economywide productivity.

I. Introduction

While there were a number of factors underlying the global financial and economic crisis, the crisis was most immediately the consequence of market failures in the housing and financial markets in the United States (US). The development of sophisticated financial derivatives purportedly allowed for an efficient transfer of risk to those best able to bear it. In practice, however, such instruments can potentially obscure the true magnitude of the huge systemic risk inherent in the financial system arising from massive lending to home buyers with subprime credit ratings. The speed and scope of such financial innovation often far outpaced the capacity of the regulatory authorities to keep up. As a result, existing prudential regulation and supervision repeatedly failed to contain excessive risk taking behavior of the market participants. The recent global crisis represents this colossal failure of prudential regulation and supervision. Predictably and understandably, there has been something of a global backlash against financial innovation and finance in general in the aftermath of the global crisis. Finance has come to be associated with crisis, credit crunch, and recession, rather than as a lubricant of growth and development.

Developing Asia's financial systems have largely escaped the paralysis experienced by their counterparts in the European Union (EU) and the US during the global financial crisis. Even during the climax of the crisis, credit flowed more or less normally from the financial system to the real economy. In particular, commercial banks, the bedrock of the region's financial system, continue to provide financing for the region's firms and households. The region was not completely free from financial instability but the bouts of instability were intermittent and sporadic rather than systematic and persistent. For example, the Republic of Korea's financial markets suffered severe turbulence in October 2008, but they soon regained their footing after the Bank of Korea entered into swap deals with the US Federal Reserve, the Bank of Japan, and the People's Bank of China. In fact, the primary impact of the global financial crisis on developing Asia was not financial at all but transmitted through the trade channel, as the recession in the industrialized countries dulled their appetite for the region's exports. A major explanation for why the region's financial systems were largely unscathed by the momentous upheaval in the global financial markets was that the region's financial institutions had very low levels of direct and indirect exposure to subprime assets such as mortgage backed securities and collateralized debt obligations. The lack of exposure to toxic assets, in turn, is widely believed to have been due to the relative lack of financial sophistication.

As the global crisis has painfully highlighted, the failure of financial regulatory authorities to monitor and control the risks associated with financial innovation can be a major

source of instability for the financial system and the real economy. Subject to adequate prudential supervision, financial innovation can promote the soundness and efficiency of financial markets. The concept of financial innovation, in the sense of complex, opaque, and poorly understood financial instruments associated with the global crisis, should not be equated with the broader and more basic concept of financial development, which refers to the development of a broad, deep, and liquid financial system that efficiently intermediates the economy's savings into various productive uses, in particular investment. Indeed, a number of constructive financial innovations developed in the past have substantially eased payment transactions, encouraged savings, helped channel savings into productive investments, and facilitated allocation of financial risks (Litan 2010).

Financial systems in developing Asia remain far below industrial-country standards and lag substantially behind its dynamic real economy particularly the manufacturing sector, which is world-class in many parts. This explains why much of the region's huge pool of savings is intermediated by financially more advanced economies outside the region. Financial development for a financially underdeveloped region such as developing Asia refers to the basic business of building up sounder and more efficient banks, equity markets, and bond markets.

If financial underdevelopment allowed developing Asia to fortuitously escape the global financial crisis, the Asian financial crisis of 1997–1998 underlines the potentially large costs of financial underdevelopment. A wide range of underlying factors contributed to the crisis, and to this debate, the relative importance of the different factors remains a subject of heated controversy. While the reversal of large inflows of volatile short-term foreign capital was the immediate catalyst of the crisis, weak and inefficient financial systems that failed to allocate capital to productive uses lay at the heart of the crisis. Much of the credit flowed into investments that failed to add to the productive capacity of the economy, hence its debt repayment capacity, most notably real estate. The Asian crisis was ultimately the consequence of a gradual deterioration in the quality of investments which, in turn, resulted from large capital inflows into underdeveloped financial systems that could not allocate them efficiently. For a region that had grown rapidly on the back of high investment rates, the Asian crisis served as a sobering view that the quality of investment matters, and matters a lot.

Fortunately, developing Asia has made a great deal of progress in building up a more robust and efficient financial system since the Asian crisis as a result of extensive postcrisis reform and restructuring. In particular, the health of Asia's commercial banks, which continue to play a dominant role in Asian financial systems, has improved markedly. This improvement is reflected in the incidence of nonperforming loans, capital adequacy ratios, rates of return on assets, and other major performance indicators. According to Adams (2008), key changes in Asian banking sectors include consolidation and rationalization, greater transparency and disclosure, increase in foreign ownership,

and decline in state ownership. Asian banks have built up sizable prudential cushions as a result of new capital injections, and their balance sheets have generally become stronger. They have also moved into new business areas such as investment banking, consumer lending, and real estate, in addition to providing a wider range of financial products and services. Furthermore, in most countries, the prudential supervision and regulation structures have been strengthened, and have become more forwardlooking and risk-based. In addition to the improvement in the health of the banking system, another positive recent development in developing Asia's financial systems has been the rapid development of equity markets, and to a lesser, extent bond markets. A more diverse financial system that is less dependent on banks is more robust and resilient to shocks. More importantly, vibrant capital markets are the primary source of long-term capital that finances an economy's long-term investment needs.

Sound and efficient financial systems that do a good job of their primary function of allocating capital to its most productive uses will be pivotal to sustaining growth beyond the crisis for one simple fundamental reason—developing Asia needs healthy investment for strong medium- and long-term growth. In the past, the primary contribution of the financial system to the region's growth has been to mobilize large pools of savings that were then used to finance the region's plethora of profitable investment opportunities. In the past, developing Asia was a low-income, capital-scarce region with inherently high marginal returns to capital. Therefore, in the context of growth, the efficiency of investment was secondary to the quantity of investment as the economies built up their capital stocks from very low initial bases. Rapid growth has transformed developing Asia into a middle-income, capital-abundant region. As a result, the region is in the midst of a transition from growth based on inputs and factor accumulation, to growth based on productivity growth (Park and Park 2010). Therefore, the primary role of the financial system in the region's growth is likely to change from that of mobilizing savings and boosting the quantity of investment to fostering productivity growth by enhancing the efficiency of investment. Such a role requires deeper, broader, and more liquid financial systems that move the region closer toward the frontier of global finance. Expanding financial access to small and medium enterprises (SMEs) and would-be entrepreneurs is vital for dynamic efficiency in which new products, services, and industries bring about structural change and deliver large welfare gains over time. Expanded access also facilitates the entry of new producers into the market and thereby stimulates a competitive environment conducive for productivity growth.

The primary role of the financial system in developing Asia's economic growth in the postglobal crisis period will thus be to improve the efficiency of investment, thereby contributing to productivity growth. The underlying rationale is the region's broader transition from accumulation-led growth to productivity-led growth. In addition to this structural shift in developing Asia's growth process, there are also a number of other factors that suggest a key role for a sound and efficient financial system in sustaining the region's growth beyond the global crisis. For one, reducing excessive dependence

on extraregional markets and rebalancing growth toward domestic sources has emerged as a key structural challenge confronting the region. Financial development can promote rebalancing by stimulating domestic consumption on the demand side and service industries catering to domestic demand on the supply side. One medium-term rationale for strengthening the financial systems is the prospect of large capital inflows attracted to the region's stronger growth prospects, and higher interest rates vis-à-vis the industrialized countries. While capital controls are one way to deal with capital inflows, a more fundamental solution lies in increasing the absorptive capacity of the financial system. A long-term rationale for sounder and more efficient financial systems is the region's rapid population ageing, which will reduce aggregate savings in the future. Again, this points to a growing need to improve the efficiency of investment. Financial development will also allow the region's financial institutions to play a greater role in intermediating the region's large pool of net savings accumulated from past external surpluses. Currently, the vast majority of those savings are intermediated by the government in the form of foreign exchange reserves.

II. Does Financial Development Promote Growth? Theory and Evidence

In this section, we review the main theoretical rationales for a positive effect of financial development on economic growth and provide a brief overview of the large and growing empirical literature that investigates the financial development–growth nexus.

A.   Financial Development and Growth: Theory

A financial system consists of financial institutions—e.g., commercial banks—and financial markets—e.g., stock and bond markets. At a broader level, a robust and efficient financial system promotes growth by channeling resources to their most productive uses and fostering a more efficient allocation of resources. A stronger and better financial system can also lift growth by boosting the aggregate savings rate and investment rate, speeding up the accumulation of physical capital. Financial development also promotes growth by strengthening competition and stimulating innovative activities that foster dynamic efficiency. According to Demirgüç-Kunt and Levine (2008), the overall function of a financial system is to reduce information and transactions costs impeding economic activity, and its five core functions are to (i) produce ex ante information about possible investments and allocate capital; (ii) monitor investments and provide corporate governance after providing finance; (iii) facilitate the trading, diversification and management of risk; (iv) mobilize and pool savings; and (v) ease the exchange of goods and services. The efficiency of a financial system refers to how well a financial system performs the five core functions and financial development refers to an improvement

in the efficiency of a financial system. Let us now elaborate upon each of the five core functions so as to gain a clearer understanding of the nexus between financial development and economic growth.

First and foremost, financial systems produce information and allocate capital. The textbook world of scarce capital seamlessly flowing to the most productive firms and industries is a world that assumes away information costs. The intermediation of savings into investments depends on the quality and quantity of information available to individual savers, but it may be too costly individual savers to acquire information on their own. Financial intermediaries such as banks collect, process, and produce information on possible investments more efficiently than individual savers. Armed with more and better information, financial intermediaries will invest in more promising firms and industries. The economywide effect is a more efficient allocation of capital that directs capital toward the more productive producers and away from the less productive producers. Financial intermediaries can also stimulate innovation by identifying the most promising new technologies and products. Large and liquid stock markets also encourage the acquisition of information by making firm-specific information more profitable.

Second, financial systems monitor firm behavior and exert corporate governance. To the extent that shareholders and creditors in a firm can effectively monitor and influence how the managers of the firm use the funds they provided, i.e., exercise corporate governance, they will have greater incentive to provide the funds in the first place. Effective corporate governance keeps managers on their toes and encourages them to use capital in ways that maximize profits and firm value. More efficient management at the firm level results in a more efficient allocation of resources for the economy as a whole. Large information and transactions costs mean that small individual shareholders and creditors do not have the incentive to engage in monitoring manager behavior. On the other hand, larger investors such as financial intermediaries face stronger incentives to monitor and have greater influence over managers. By improving corporate governance, financial intermediaries can have a positive effect on growth. Stock markets can also serve as a powerful for aligning the interests of firm mangers with those of firm owners.

Third, financial instruments, intermediaries, and markets can facilitate the trading, hedging, and pooling of risk. By enabling risk diversification across firms and industries, financial systems can influence the allocation of resources and hence economic growth. While individuals are generally averse to risk, high-return investment opportunities tend to be high-risk. By allowing individuals to diversify their risk, financial intermediaries and markets divert more capital to high-risk, high-return investment projects and thereby boost the overall productivity of capital. Risk diversification also has a positive impact on innovative activity since risk-averse savers are more likely to invest in a portfolio of new technologies and products than a single new technology or product. Financial markets and intermediaries also mitigate liquidity risk, and thereby induce savers to invest in

high-return projects requiring a long-term commitment of capital. Highly liquid markets for stocks, bonds, and demand deposits transform these financial instruments into investments and into high-return, long-term projects.

Fourth, financial systems pool or mobilize savings from different savers for investment. The mobilization of savings involves collecting savings from a large number of individuals into collectively large amounts that can finance even very large investment projects. Both financial intermediaries and financial markets can perform this function. Financial systems that are better able to mobilize savings create a larger pool of savings that lead to higher aggregate investment, faster rate of capital accumulation, and hence faster economic growth. Given that one of the hallmarks of developing Asia's economic success was its high saving and investment rates, this core function has been important for the region's growth in the past. More generally, the mobilization of savings for investment matters more for low-income, capital-scarce economies, which typically enjoy higher marginal returns to capital. The high relative importance of the savings mobilizing function of financial systems at low income levels mirrors the high relative importance of quantitative capital accumulation in the early stages of the growth process.

Fifth, at a more fundamental level, financial instruments, intermediaries, and markets can stimulate specialization, innovation, and growth by reducing transactions costs. The transition from barter economy to a monetary economy brings about a quantum leap in efficiency and welfare as a result of the three basic functions of money—means of payment, unit of account, and store. By reducing the transactions costs of economic exchange and activity, money enables workers to specialize in specific activities. Greater specialization, in turn, improves the capacity of workers to create new technologies and products. The end result of increased specialization and innovation is faster economic growth. The decline in transactions costs does not stop with the introduction of money but will continue as long as there is financial innovation. Credit cards and automated teller machines are but two examples of financial innovation that have cut transactions costs. Financial innovation that reduces the cost of economic exchange and activity will spur further specialization and innovation and thereby contribute to growth.

In the case of developing countries, including developing Asia, stability or lack thereof of the financial system is another channel through which financial development influences growth. A sound financial system is characterized by healthy financial institutions and smooth, well-functioning financial markets, which jointly allow for robustness and resilience in the face of adverse shocks. For example, as noted earlier, the balance sheets of developing Asia's banks have become markedly stronger since the Asian crisis as a result of consolidation, recapitalization, and more generally, restructuring and reform. Likewise, sound equity and bond markets are markets with enough size, breadth, depth, liquidity, and sophistication so that their movements are broadly in line with fundamentals rather than subject to excessive noise and volatility. An effective prudential regulatory and supervisory framework, along with the risk management capacity of banks and sound

market infrastructure of the bond and equity markets, holds the key to ensuring stability of the financial sector. Developing Asia would have suffered a much steeper decline in growth had it suffered the same level of financial instability experienced by the EU and the US during the global financial crisis. Furthermore, during the Asian crisis many countries in the region were firsthand witnesses to the devastating impact of financial instability on the real economy. Therefore, in the context of fostering growth, an integral component of developing Asia's financial development must be to build up robust and resilient financial systems capable of withstanding even large shocks.

Another dimension of financial development that has a special resonance for developing Asia and other developing countries is access to financial services. Relative to industrialized countries, the access of firms and households in those countries remains limited. Lack of access to finance can be a serious barrier to investment and business activity in general. In particular, lack of new financing often impedes setting up new businesses essential to a dynamic economy. New firms are especially important in knowledge-based industries that will grow in significance as the region's economies mature. More generally, entrepreneurship is essential for a vibrant private sector that constantly renews itself and creates new firms, industries, and jobs, for which access to finance is the indispensable lubricant for entrepreneurship. Adequate financing for SMEs, which tend to predominate in the services sector, will help revitalize the region's services sector that has lagged its manufacturing sector for a long time. Access to finance, whether through mainstream financial institutions or through microfinance and other specialized institutions, can expand the opportunities for poorer households to engage in productive activities. For example, rural finance can provide rural households with the money to buy high-yield seeds, fertilizers, and farming equipment. Just as importantly, access to finance confers substantial welfare gains for poorer households by, for example, allowing them to smooth their lifetime consumption and coping with negative shocks. Therefore, access to finance can contribute to narrow economic growth as well as broader social development.

B.   Financial Development and Growth: Evidence

Economic theory and intuition suggest a number of plausible channels through which financial development can have a positive effect on economic growth. Predictably, a large and growing empirical literature has sprung up to examine the relationship between finance and growth. At a broader level, the literature looks at the impact on gross domestic product (GDP) growth of (i) the depth of the financial system, as measured by indicators such as the ratio of total liquid liabilities to GDP, the ratio of bank credit to GDP, or the ratio of stock market capitalization to GDP; and (ii) the structure of the financial system, as measured by indicators such as the ratio of bank credit to stock market capitalization. The balance of evidence from the empirical literature strongly indicates that financial depth has a significant positive effect on growth whereas financial structure (the relative weight of banks versus capital markets) does not have any appreciable effect

on growth. More specifically, bank development and stock market development exerts a significant positive effect on growth, as does overall financial development. Although a shift from banks to capital markets is often viewed as evidence of financial development, countries with market-based financial systems do not perform better than those with bank-based systems. Therefore, the broader finding from the empirical literature is that what matters for economic performance is overall financial development rather than the relative weight of its various components.

In a comprehensive review of the empirical literature, Demirgüç-Kunt and Levine (2008) point out that the literature contains four different types of studies: (i) pure cross-country growth regressions, (ii) panel techniques that make use of both the cross-country and time-series dimensions of the data, (iii) microeconomic studies that explore the various channels through which finance may affect economic growth, and (iv) individual country case studies. The first approach involves the application of broad cross-country growth regressions, which seek to explain growth through standard explanatory variables such as physical and human capital, to the study of finance and growth. These studies typically aggregate growth over long periods of time and examine the relationship between long-run growth and various measures of financial development. The second approach involves the analysis of panel data and seeks to mitigate some of the econometric problems associated with the pure cross-country approach. The second approach has a number of well-known advantages vis-à-vis the first approach even though it also suffers from some disadvantages. The third approach uses firm-level and industry-level data to assess the impact of financial development on firm and industry performance. A positive impact would lend support to the notion that financial development is beneficial for growth. The fourth country drops the cross-country dimension and looks at the finance growth in a single individual country. For example, some studies analyze the impact of a specific policy change in a country.

We now discuss in more detail the literature on cross-country growth regressions, including those that use panel techniques, since this is the approach we use for our own empirical analysis. Empirical assessment of the relationship between growth and financial development involves a wide range of econometric techniques and data sets. In the earlier cross-country regression studies, economic growth is usually averaged over long periods while financial indicators are either averaged over the same period or taken from the initial year. In addition, a number of macroeconomic indicators are used as control variables. A pioneering early study in King and Levine (1993), who examine the relationship between financial depth, as measured by liquid liabilities, and three growth measures, namely, real per capita GDP growth, real per capita capital stock growth, and total productivity growth, all averaged over the sample period. Using data for 77 countries over the period 1960–1989, King and Levine find a statistically significant positive relationship between financial depth and the three growth measures.

Cross-country regression has also been employed to examine individual effects of banks and nonbank financial institutions on growth. The study by Levine and Zervos (1998) find the initial level of banking development and stock market activity as having statistically significant relationships with average output growth, capital stock growth, and productivity growth, based on data for 47 countries over the period 1976–1993. They also perform contemporaneous regressions, which use dependent and independent variables averaged over the same period, and these yield similar results. They use bank credit to the private sector as measure of banking development. For stock market development, they use turnover ratio and value traded to represent stock market liquidity, and stock market capitalization to measure size of the equity market. Stock market liquidity measures are found to be robust predictors of future economic growth but stock market size is not. In addition, the results of stock market size regression are strongly influenced by a few countries.

Beck and Levine (2004) apply panel econometric techniques along with new data to re-examine the relationship between stock markets, banks, and economic growth. They examine whether measures of stock market and bank development each have a positive relationship with economic growth after controlling for simultaneity bias and omitted variable bias. They use data for 40 countries, averaged over 5 years from 1976 to 1998, and employ generalized method of moments (GMM) estimators for panel data analysis. Both stock markets and banks are found to be jointly significant in affecting economic growth in their panel estimation, thus suggesting that stock markets provide different financial services from banks.

The study by Levine, Loayza, and Beck (2000) likewise implement GMM panel estimators to analyze the link between financial development and growth. In addition, they complement this with a cross-country instrumental variable regression. For the panel estimation, data are averaged over each of the seven 5-year intervals over the period 1960–1995 for 74 countries. In the instrumental variable regression, legal origin is used as instrument on the premise that this has an influence on national policies related to the efficiency of the financial sector. Levine et al. conclude that the significant link between financial intermediary development and economic growth is not due to potential biases induced by omitted variables, simultaneity, or reverse causation. Regardless of the econometric techniques and data set employed, a growing body of evidence indicates that financial development is important for growth.

While various econometric techniques have been developed to more rigorously investigate the relationship between financial development and growth, weaknesses in measures of financial development remain. Ideally, financial development indicators should be able to measure how well the financial system addresses information asymmetries, reduces transactions costs, mobilizes resources, and manages risk since these are the direct mechanisms through which financial development promotes growth. Traditional indicators of financial depth such as the ratio of bank credit to GDP are at best highly imperfect measures of how well the financial system performs such growth-

promoting services. Unfortunately, as of now, no indicator is able to adequately capture these financial services, so empirical studies, including our own, rely on traditional measures of financial development (Rajan and Zingales 1998, Levine and Zervos 1998, and Demirgüç-Kunt and Levine 2008).

III. Developing Asia's Financial Development: Some Stylized Facts

In this section, we explore some stylized facts of financial development in developing Asia. More specifically, we first compare the financial depth of developing Asian countries with that of countries of the Organisation for Economic Co-operation and Development (OECD). We then look at traditional indicators of financial depth such as bank credit to GDP ratio and traditional indicators of financial structure such as the ratio of bank credit to stock market capitalization, across subregions and over time. We then compare how some major developing Asian countries compare to the industrialized in terms of financial access. Finally, we examine the correlation between financial development and economic growth in developing Asia, and how the correlation may have changed since the Asian crisis.

A. Comparison of Financial Depth in Developing Asia versus OECD

There is a widespread perception that developing Asia's financial systems substantially lag its real economy despite a great deal of progress in recent years. An equally popular perception is that the region remains financially underdeveloped relative to industrialized countries. Figure 1, which compares the financial development of some major developing Asian countries with that of OECD, provides an informal examination of those views. Bank lending as a proportion of GDP in Bangladesh, India, Indonesia, Pakistan, and the Philippines is less than one half that in the OECD economies, but the People's Republic of China (PRC) and Thailand are already closing in the gap. The disparity with OECD is likewise evident in capital markets. While stock markets have recently been gaining ground in developing Asia, they are still way below that of OECD, especially in the case of Bangladesh, Indonesia, and Pakistan. An exceptional case is India, whose stock market capitalization dramatically shot up after 2002 to reach about 170% of GDP in 2008, surpassing the average OECD figure. The gap with OECD is more pronounced in bond markets. Only recently have bond markets expanded rapidly, and these are due to official measures undertaken to develop local currency bond markets, including regional efforts such as the Asian Bond Markets Initiatives and the Asian Bond Funds. Despite the expansion, Asian local currency bond markets remain underdeveloped.

Figure 1: Financial Depth, Selected Asian Countries and High-Income OECD Countries, 2008 (percent of GDP)

Overall Financial Markets and Banks

■Liquid Liabilities ■Private Credit

Capital Markets

■Stock Market ■Bond Market
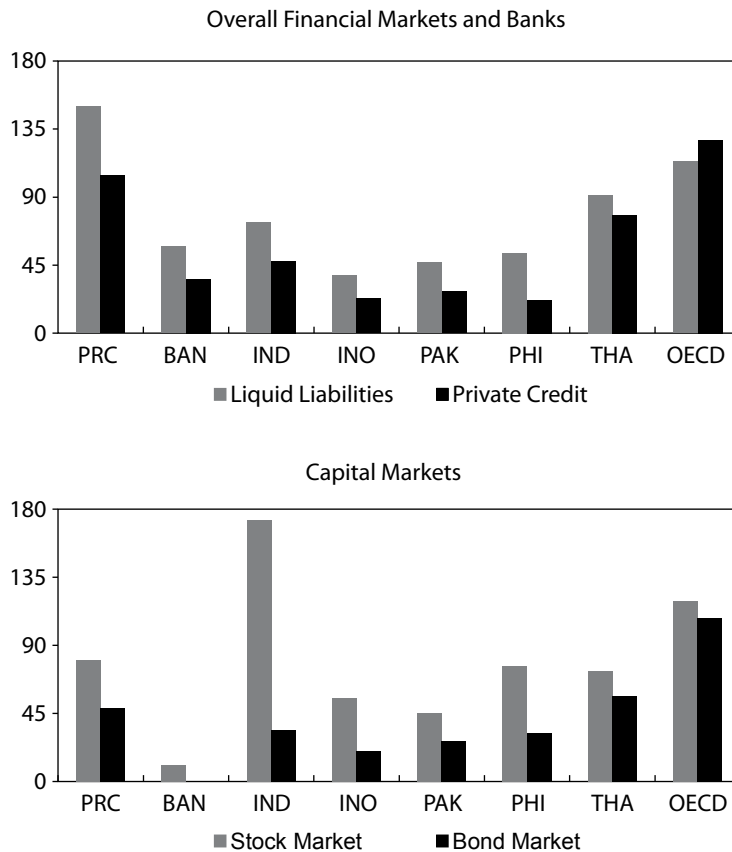
GDP = gross domestic product, PRC = People's Republic of China, BAN = Bangladesh, IND = India, INO = Indonesia, PAK = Pakistan, PHI = Philippines, THA = Thailand, OECD = Organisation for Economic Co-operation and Development.
Note: Data on stock market and bond market refer to total market capitalization.
         High-income OECD excludes the Republic of Korea, Poland, and Slovenia.
Sources: Authors' estimates; Beck, Demirgüç-Kunt, and Levine (2010); CEIC Data Company (accessed 30 June 2010).

B.   Financial Depth, Breadth, and Access in Developing Asia

Financial depth provides a measure of the size of the financial system relative to size of the economy (or GDP). Financial breadth is a gauge of the relative importance of banks relative to capital markets (i.e., equities and bonds), and thus provides an indication if a financial system has diversified from primarily banking services toward greater use of capital markets. Indicators for both depth and breadth are available for a large number of countries across several years in the Financial Development and Structure Database of Beck et al. (2010). As Figures 2, 3, and 4 show, owing to the expansion of both the banking sector and capital markets, aggregate financial depth in the region has increased since the 1990s. Growth in private credit was clearly on a rising trend in the 1990s but began to soften after the 1997–1998 Asian financial crisis. Capital markets (stock and

bond markets) have grown rapidly in recent years. Across the region, there is some variation in the extent by which the banking sector and capital markets have performed.

Figure 2: Private Credit (percent of GDP)
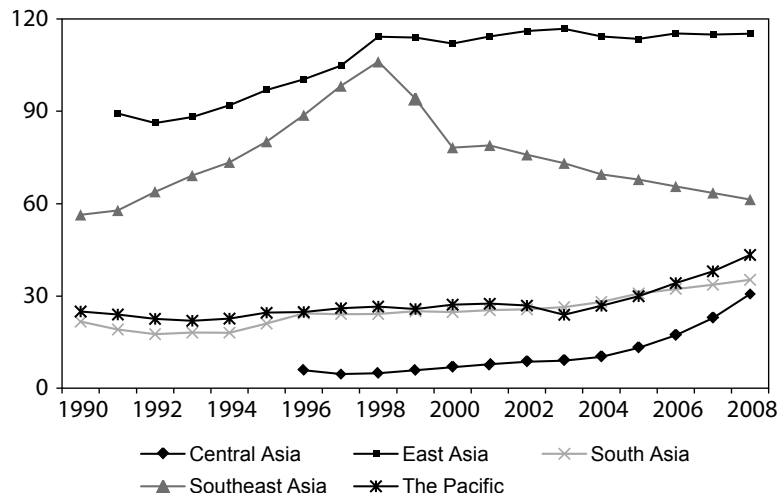
GDP = gross domestic product.
Note: Central Asia consists of Armenia, Georgia, Kazakhstan, and the Kyrgyz Republic.
         East Asia covers the People's Republic of China; Hong Kong, China; the Republic
         of Korea; and Taipei,China. Southeast Asia is made up of Indonesia, Malaysia, the
         Philippines, Singapore, and Thailand. South Asia is composed of India, Pakistan,
         and Sri Lanka. The Pacific comprises the Fiji Islands, Papua New Guinea, Samoa,
         Solomon Islands, and Tonga.
Sources: Authors' estimates based on data from Beck, Demirgüç-Kunt, and Levine (2010)
         and CEIC Data Company (accessed 30 June 2010).

Figure 3: Stock Market Capitalization (percent of GDP)
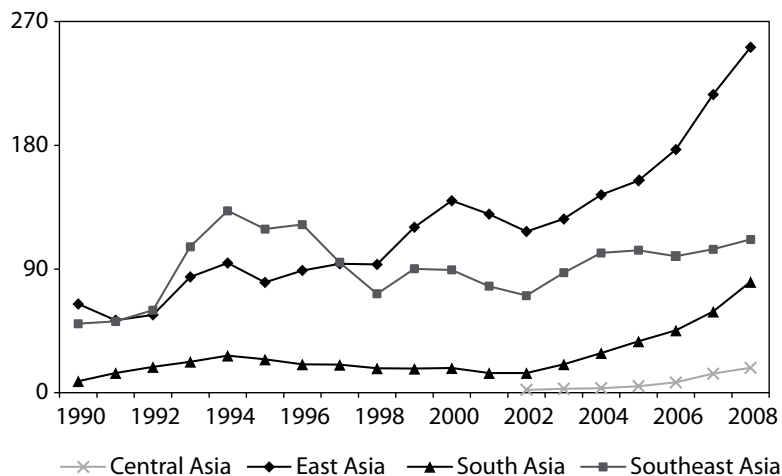
Note: See Figure 2.
Sources: See Figure 2.

Figure 4: Bond Market Capitalization (percent of GDP)

East Asia and India

East Asia — China, People's Rep. of ◆ — Hong Kong, China ■
Korea, Rep. of ▲ — Taipei,China ✕ — India ✳

Southeast Asia

Southeast Asia — Indonesia ◆ — Malaysia ■
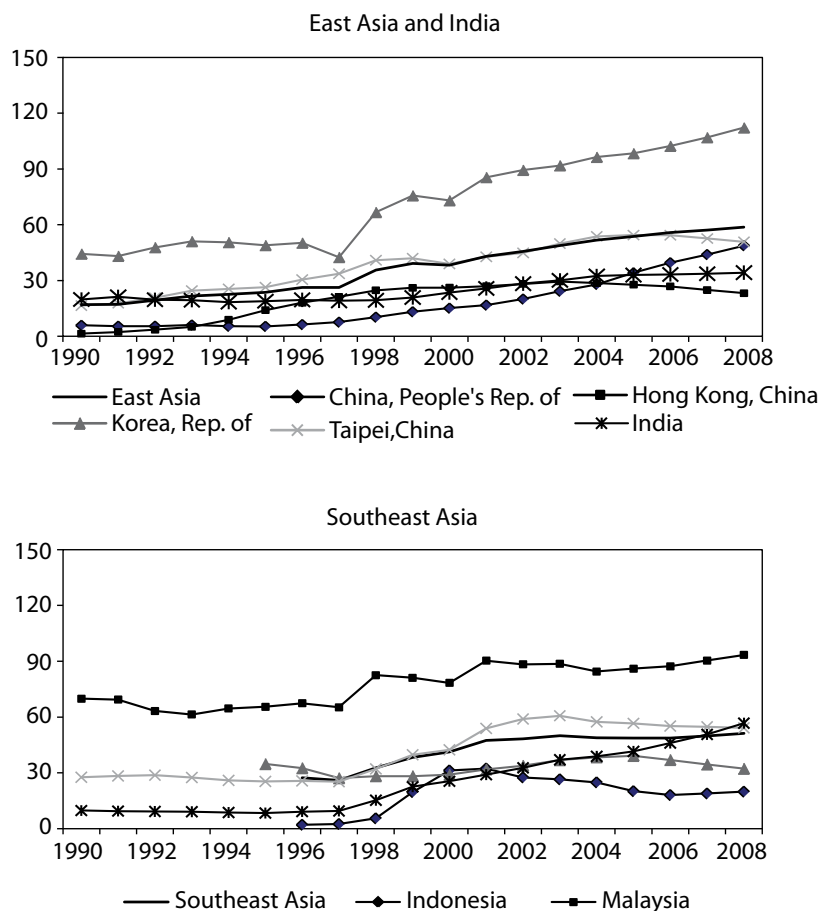
Sources: See Figure 1.

In East Asia, total financial depth—as measured by bank credit, stock market capitalization, and bond market capitalization—has almost doubled in 2008 as a percentage of GDP compared to their levels over a decade ago. There was no almost discernible change in bank credit in this subregion, yet the total size of its equity and bond markets have increased twofold in the postcrisis, driving the growth in overall financial depth. In South Asia, both the banking sector and capital markets have been important in the deepening of the financial sector. Undoubtedly, the rising financial depth in South Asia is primarily driven by India, where strong economic growth has been accompanied by marked improvements in bank lending and equity markets. Central Asia and the Pacific have also witnessed deepening, albeit modest, in their financial markets. Still, the financial sectors in these subregions are dominated by the banking sector. While equity markets are present in some economies in Central Asia, on average they account for less than 20% of GDP, a far cry from the levels in the rest of the region. In contrast to other subregions, the size of the financial sector in East Asia has remained

unchanged since the Asian financial crisis—its aggregate financial depth was quite high in the mid-1990s at over 200% of GDP, and this was somewhat maintained throughout the postcrisis. In the case of Indonesia, Malaysia, the Philippines, and Thailand, bank credit gradually rose in the 1990s and reached their peak levels in 1997–1998, before steadily falling. By 2008, banking loans in these countries were just about one half of what they were from their peak levels. The ensuing decline in bank lending after the Asian financial crisis may be viewed as a correction of the excesses in lending prior to the crisis. Banks have also become better at managing their risks since the financial crisis, and hence have reduced their lending.

Alongside a deepening of its financial markets, the region has witnessed changes in its financial structure, as seen in the strengthening of capital markets relative to bank credit. Figure 5 indicates that the ratios of total capital markets—sum of stock market capitalization and bond market capitalization—to bank credit have increased for most countries in East Asia and Southeast Asia, and in India in the postcrisis. For countries such as India, the Republic of Korea, and Viet Nam, the increases in the ratio of capital markets to bank credit have been due to bigger increases in capital markets relative to expansion of bank lending. For the PRC and Taipei,China, the ratio of capital markets to bank credit rose mainly because of the upturn in capital markets; their bank credit was almost unchanged in the postcrisis. But for Hong Kong, China and most countries in Southeast Asia, the ratio of capital markets to bank credit has risen due to increases in capital markets amid declines in bank credit.

While both equity and bond markets have improved across countries in the region, it is the growing equity markets that have largely contributed to the rising importance of capital markets relative to bank credit. For example, in East Asia, the ratio of its stock market to bank credit increased to 2 in 2008, roughly double its ratio in 2000. In contrast, the ratio of its bond market to bank credit rose to just 0.51 from 0.34 in the same period. Overall, trends indicate that the region appears to be moving toward a more broad-based financial system. While the pace of financial deepening has tended to slow across much of the region, financial broadening has strengthened (see Adams 2008). While equity markets have steadily risen, still much needs to be done in developing the region's lagging bond market. Bank lending has also remained restrained, reinforcing the need to strengthen and diversify the region's financial system.

Broad access of financial services is important for a number of reasons. It is important for poverty reduction, since constraints in financial services have prevented the poor or those with no collateral from engaging in profitable businesses. Limited access to finance also prevents the entry of new and innovative firms incapable of self-financing. Access to financing has important effects on how technology and new knowledge are developed, as availability of financing provides an incentive to think creatively (see Beck et al. 2007). There is not much evidence linking financial access to development outcomes because of lack of data (World Bank 2008). There are limited surveys that collect information on access of households or firms. In the absence of data that directly measure access, crude indicators that relate to geographic access or the use of financial services have recently been used in the literature.

Figure 5: Ratio of Capital Markets to Private Credit (percent of GDP)

East Asia and India

East Asia — China, People's Rep. of — Hong Kong, China — Korea, Rep. of — Taipei,China — India

Southeast Asia

Southeast Asia — Indonesia — Malaysia — Philippines — Singapore — Thailand
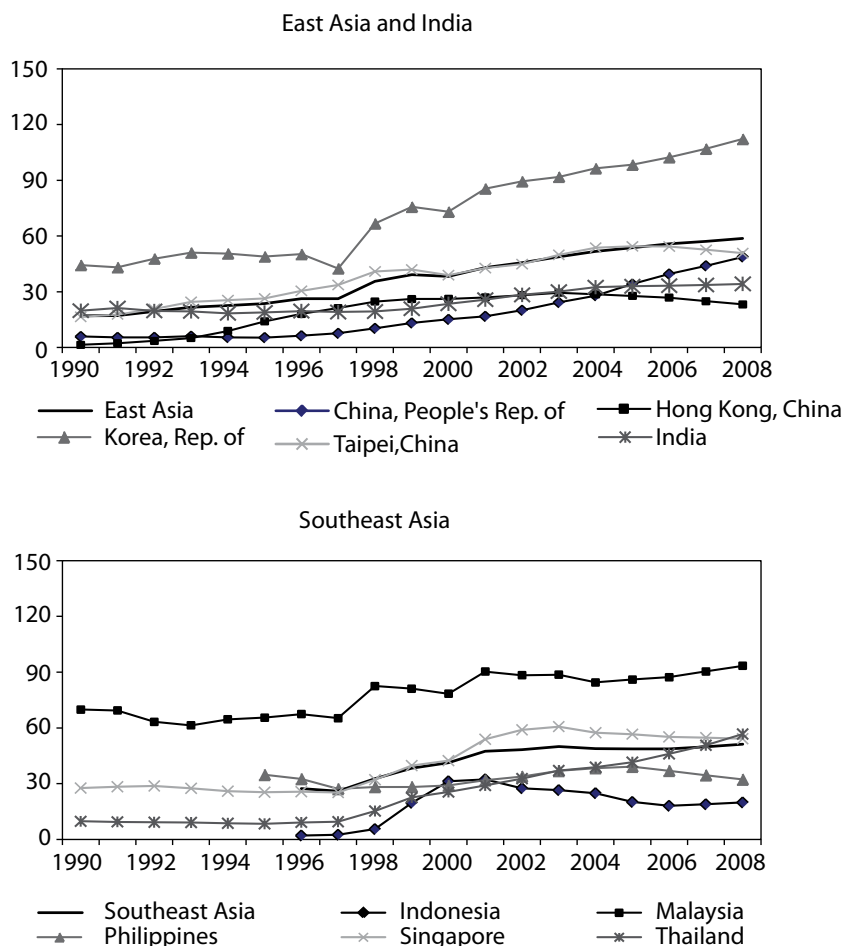
Note: Capital markets refer to the sum of stock market capitalization and bond market capitalization.
Source: See Figure 1.

Figure 6 shows that financial access, measured by bank branches and ATMs per 100,000 people, varies substantially across selected developing Asian countries. Overall, financial access in these countries is also more difficult compared to OECD, which again supports the notion that the region is financially underdeveloped. Firms surveyed by the World Bank's Enterprise Surveys (World Bank, various years) consider access to financing as a major constraint. Small and medium enterprises also tend to find access to financing more difficult compared to large firms, and this was evident in firms surveyed in Indonesia, the Republic of Korea, Malaysia, the Philippines, Thailand, and Viet Nam. Across countries, survey data also indicate that less than 20% of small firms surveyed use external finance, about half the rate of large firms (World Bank 2008). While physical access prevents some SMEs from access financial services, limited assets or lack of collateral and documentary requirements for bank lending are additional barriers. Developing more competitive banking systems may improve access of SMEs to financial services.

**Figure 6: Access to Banking Services, Selected Asian Countries
versus High-income OECD Countries, 2008**
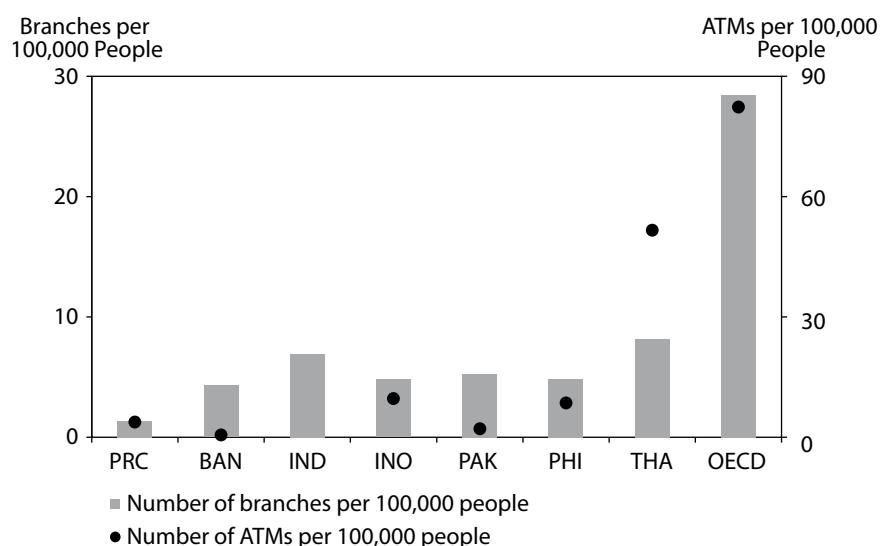
ATM = automated teller machine, PRC = People's Republic of China, BAN = Bangladesh, IND = India,
INO = Indonesia, PAK = Pakistan, PHI = Philippines, THA = Thailand, OECD = Organisation for
Economic Co-operation and Development.
Note: Data for the PRC are based on the 2003/2004 survey by Beck et al. (2007). High-income OECD
excludes the Republic of Korea, Poland, and Slovenia.
Sources: Authors' estimates based on data from Beck, Demirgüc-Kunt, and Peria (2007); International Monetary Fund's Financial
Access online database, available: www.imf.org; and World Bank's World Development Indicators online database, both
online databases accessed 31 August 2010.

C.   Correlation Between Developing Asia's Financial Development and Growth

The next section of this paper formally examines the central issue of this paper, the relationship between financial development and economic growth, through econometric analysis. Economic theory suggests that more robust and efficient financial systems will have a positive effect on growth, and hence a positive relationship between the two variables. Figure 7 indicates the presence of a positive relationship for developing Asia in the 1990s, but the relationship has weakened after the crisis. Figure 8 shows the correlations between growth and three measures of financial development: liquid liabilities, private credit, and stock market capitalization, all as a percentage of GDP. The correlations were positive in 1990–1997, although a weaker relationship was observed between growth and stock market development. In the postcrisis, the correlations have turned very weak or even negative. This does not necessarily indicate that the contribution of financial development to economic growth has weakened in the postcrisis period. Instead the more likely explanation for the weaker correlation is that countries in the region, especially those affected by the Asian crisis, have made adjustments to correct the overinvestment and overlending immediately prior to that crisis. Better risk management by banks and more accurate pricing of risk signal financial development, notwithstanding the stagnation or reduction of bank credit.

Figure 7: Growth and Financial Development, Selected Developing Asian Economies

a. Liquid Liabilities

b. Private Credit

c. Stock Market Capitalization
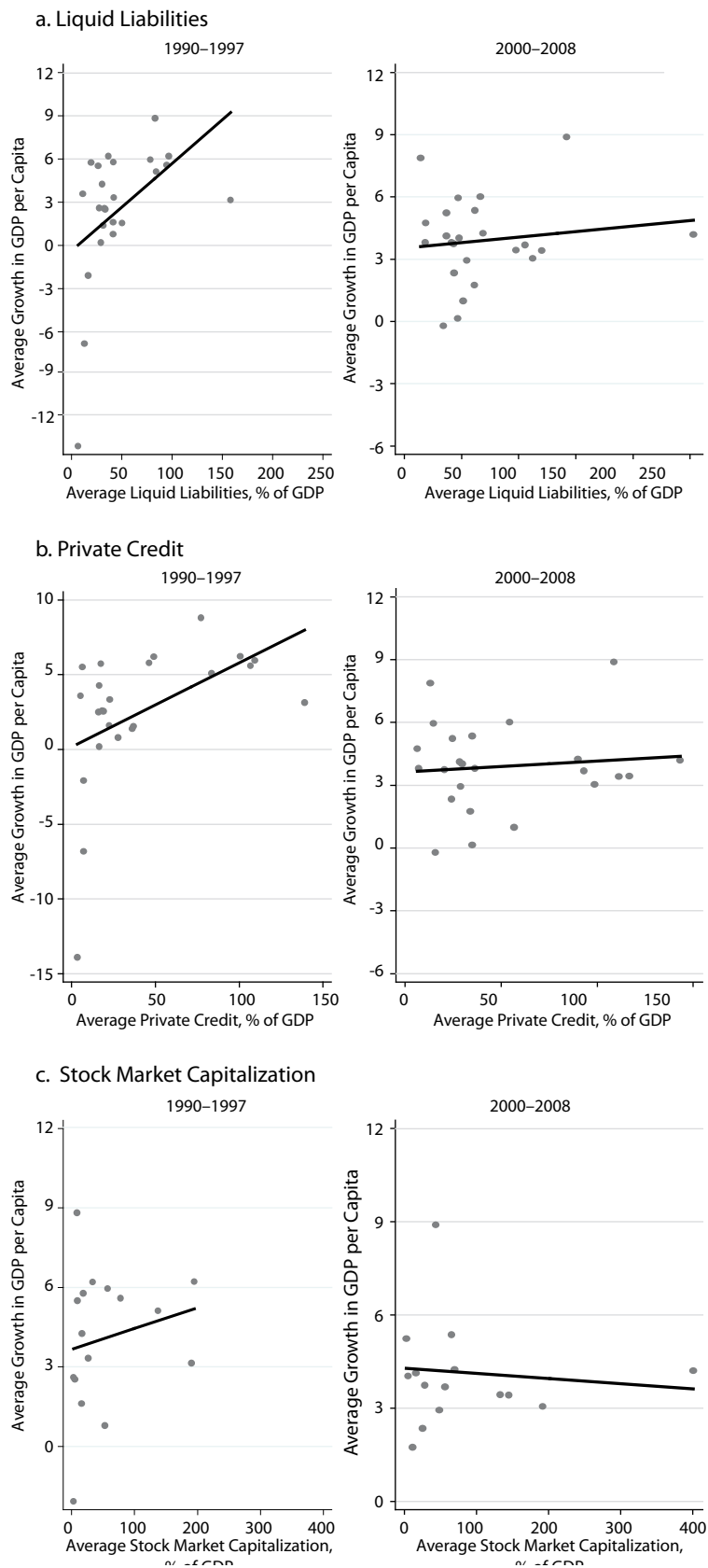
Source: See Figure 1.

Figure 8: Correlations between Growth and Financial Development, Developing Asia
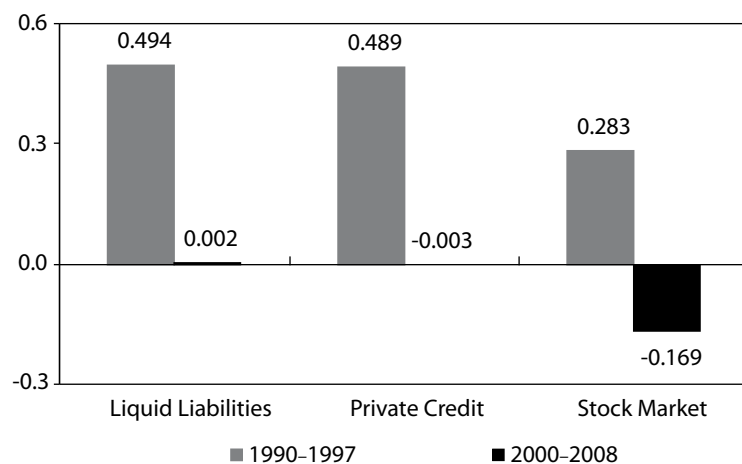
Source: Authors' estimates.

D. Overall Summary of Stylized Facts

Our brief review of the main stylized features of developing Asia's financial systems by and large confirms much of the conventional wisdom. The region remains financially underdeveloped relative to the industrialized countries despite marked progress in its financial development in recent years, especially since the Asian crisis. In particular, the region's bond markets remain underdeveloped relative to its banks and equity markets. Related to this, access to financial services, an important but often overlooked aspect of financial development, in the region also lags the industrialized countries. The region has experienced substantial financial deepening and this deepening has been driven primarily by expansion of the capital markets, in particular equity markets. In contrast to the fast-growing capital markets, bank credit has remained subdued since the Asian crisis and this probably reflects, at least to some extent, the correction of excesses in the precrisis period. For the same reason, the correlation between financial development and growth has weakened markedly since the Asian crisis.

IV. Empirical Analysis of the Finance–Growth Relationship

In this section, we describe the data and econometric methodology we use to investigate the relationship between financial development and economic growth, and report and discuss the main findings emerging from our analysis. Broadly speaking, our methodology closely follows the cross-country growth regressions strand of the existing empirical

literature on finance and growth, except that we use panel data and estimation techniques suitable for such data. This strand of the literature is based on the regression of economic growth on indicators of financial development as well as a number of control variables affecting growth. A positive and significant effect of the financial development indicators would lend empirical support to a beneficial role of finance in growth. In addition to output growth, we also explore the impact of financial development on total factor productivity (TFP) growth, the measure of productivity growth. Further, we also explore whether there has been a change in the impact of finance in Asian countries before and after the Asian financial crisis; whether the impact differs for developing versus industrialized countries; and finally, whether the impact differs for developing Asian countries. Our empirical analysis will help to shed some light on the critical issue of whether finance matters for growth.

A.   Model and Data

Following the general approach in the literature, this study applies econometric techniques to examine the relationship between financial development and growth. The basic structure of the econometric model closely follows empirical models tested in the literature (for example, King and Levine 1993):

$$x_{i,t} = \alpha + \beta \left[FD \right]_{i,t} + \lambda \left[Other \right]_{i,t} + \varepsilon_{i,t} \tag{1}$$

where a number of financial sector development [FD] indicators and a number of nonfinancial control variables [Other] are assumed to affect economic growth or TFP growth (x).

For measures of economic growth, the paper uses a series of nonoverlapping 5-years average of GDP per capita growth for each of the sample countries. The TFP growth is taken from Park and Park (2010), which derives TFP data from a neoclassical production function that takes into account adjustments in human capital. By incorporating average years of schooling (h) from Barro and Lee (2010) to augment labor, the production function then becomes:

$$Y = AK^{1-\alpha_L} (hL)^{\alpha_L} \tag{2}$$

where Y is GDP, K is the capital stock, L is labor, and A is a measure of the state of technology used in the production process that represents TFP. As is the case for the growth regression, TFP growth is also represented by a nonoverlapping 5-year average of each of the sample.

There are three indicators of financial development used in this study:

(i)   Total liquid liabilities relative to GDP, which measures the relative size of overall financial depth consisting of currency plus demand and interest-bearing liabilities of banks and nonbank financial intermediaries. This is the broadest measure of the financial intermediation activity since it covers all banks, central banks, or nonfinancial intermediary activities.

(ii)   Private credit by deposit money banks relative to GDP. This measure isolates only the impact of the banking sector.

(iii)   Stock market capitalization relative to GDP, which gauges the relative size of equity market in an economy.

All three indicators are obtained from Beck et al. (2010). In addition, some of our regressions also include an indicator of financial openness, namely capital inflows relative to GDP, which measure the relative size of the total direct investment and portfolio investment in an economy. This indicator is computed from the International Financial Statistics online database.

The full sample of the GDP per capita growth regression is a cross-country panel data set covering 116 economies (of which 22 are ADB members) with four nonoverlapping 5-year periods from 1987 to 2008. In all regressions, data for 1997–1998 were dropped to take out undue influence of the Asian financial crisis. The 5-year periods correspond to 1987–1991, 1992–1996, 1999–2003, and 2004–2008. Due to data constraints, not all economies have four observations each, hence, the full sample in the GDP per capita growth regression is an unbalanced panel of 385 observations. For the TFP regressions, data are only until 2007 since TFP estimates are available only until that year. A total of 111 economies with 363 observations are included in the full unbalanced sample of TFP regressions. Given data limitations, regressions involving stock market data have reduced observations. (See Appendix 1 for the list of economies and the corresponding number of observations included in the regressions.)

A number of control variables are included to control for other factors affecting growth (representing [*Other*] in the above behavioral equation). The choice of these variables closely follows those used in many growth regression analyses done previously (Levine et al. 2000). Initial GDP per capita from the World Bank's World Development Indicators online database is included to account for growth convergence effect. Years of schooling from Barro and Lee (2010) is included to represent of human capital accumulation on growth. The model also controls for quality of governance by including the executive constraint indicator from Polity IV (Marshall and Jaggers 2009), which measures the extent of institutionalized constraints on the decision-making powers of chief executives. Other standard growth determinants controlled for are relative trade openness, inflation, and government consumption, all taken from the World Bank's World Development Indicators online database. The above control variables were averaged for each 5-year

period, except for the initial GDP per capita, which is taken as the value at t–5. In the TFP regression, initial TFP is controlled for instead of GDP per capita (see Appendix 2 for the variable description).

To examine possible differences in how financial sector development affects growth in GDP and TFP, the study considers several specifications. The baseline model includes all control variables except financial openness. The other models also incorporate dummy variables, interacted with financial indicators, to examine differential effects of post-Asian financial crisis years, levels of development, and exchange rate regimes. The post-Asian financial crisis dummy variable takes on a value of 1 for ADB members after 1999, and 0 otherwise. The level of development dummy is based on the World Bank classification and takes on a value of 1 for those not classified as high income OECD or non-OECD. Finally, a "dmc" dummy, interacted with financial indicators, is also added to differentiate between coefficients of ADB members and those of non-ADB members.

B.   Empirical Results

In this section, we report and discuss the results of our regressions. The results from the baseline per capita GDP growth regressions which try to explain per capita GDP growth with financial development indicators and control variables are presented in Tables 1–3. The baseline models do not include financial openness as an explanatory variable. The financial development indicators are total liquid liabilities for Table 1, bank credit for Table 2, and stock market capitalization for Table 3. Table 4 includes both bank credit and stock market capitalization as separate explanatory variables. We use the fixed effects approach to account for the unobserved heterogeneity of the countries in the sample. Fixed effects models essentially account for the country-specific characteristics of the sample. The data is transformed by removing the individual country average elements from each of the variables used in the regression to wash out its country specific characteristics. Therefore, we exploit both the within-country and time variations of the data to estimate the regression parameters. In general, our results are sensible and consistent with economic intuition as well as the findings of the empirical literature.

**Table 1: Real per Capita GDP Growth Regression Results
(financial indicator = total liquid liabilities)**

	(1)	(2)	(3)	(4)
Initial real per capita GDP	-8.416***	-8.381***	-8.751***	-8.517***
	(-6.890)	(-6.621)	(-7.855)	(-6.768)
Years of schooling	3.545**	3.526**	3.753***	3.510**
	(2.481)	(2.450)	(2.668)	(2.424)
Government spending, % of GDP	-4.522***	-4.535***	-4.073***	-4.455***
	(-3.986)	(-3.979)	(-3.613)	(-4.013)
Inflation	-1.344***	-1.344***	-1.360***	-1.340***
	(-4.010)	(-4.006)	(-4.232)	(-4.057)
Trade openness, % of GDP	3.225***	3.231***	2.915***	3.188***
	(3.113)	(3.133)	(2.806)	(3.032)
Governance	-0.099	-0.102	-0.033	-0.091
	(-0.679)	(-0.689)	(-0.225)	(-0.611)
Liquid liabilities, % of GDP	2.792***	2.554**	2.036**	2.756***
	(3.736)	(2.017)	(2.425)	(3.694)
Liquid liabilities x developing country dummy		0.277		
		(0.206)		
Liquid liabilities x DMC dummy			3.139**	
			(2.222)	
Liquid liabilities x postcrisis dummy				0.066
				(0.302)
Constant	52.166***	52.173***	54.828***	53.059***
	(6.105)	(6.111)	(6.929)	(5.742)
Observations	385	385	385	385
Number of economies	116	116	116	116
Adjusted R-squared	0.418	0.417	0.430	0.417

*** $p<0.01$, ** $p<0.05$, * $p<0.1$.
DMC = developing member country, GDP = gross domestic product.
Note: Robust t-statistics in parentheses.
Source: Authors' estimates.

Table 2: Real per Capita GDP Growth Regression Results
(financial indicator = bank credit)

	(1)	**(2)**	**(3)**	**(4)**
Initial real per capita GDP	-8.855***	-8.756***	-8.918***	-9.236***
	(-6.105)	(-5.969)	(-6.271)	(-6.219)
Years of schooling	3.384**	3.293**	3.494**	3.299**
	(2.373)	(2.271)	(2.483)	(2.253)
Government spending, % of GDP	-4.614***	-4.716***	-4.472***	-4.471***
	(-4.289)	(-4.311)	(-4.114)	(-4.208)
Inflation	-1.422***	-1.419***	-1.428***	-1.401***
	(-4.201)	(-4.191)	(-4.262)	(-4.317)
Trade openness, % of GDP	3.802***	3.843***	3.662***	3.697***
	(3.626)	(3.691)	(3.428)	(3.491)
Governance	-0.055	-0.066	-0.033	-0.039
	(-0.416)	(-0.488)	(-0.245)	(-0.286)
Private credit, % of GDP	1.772***	1.299*	1.586**	1.812***
	(3.068)	(1.712)	(2.397)	(3.143)
Private credit x developing country dummy		0.625		
		(0.741)		
Private credit x DMC dummy			0.893	
			(0.878)	
Private credit x postcrisis dummy				0.193
				(0.890)
Constant	58.028***	57.877***	58.494***	60.883***
	(5.867)	(5.890)	(6.040)	(5.858)
Observations	385	385	385	385
Number of economies	116	116	116	116
Adjusted R-squared	0.422	0.422	0.423	0.424

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
DMC = developing member country, GDP = gross domestic product.
Note: Robust t-statistics in parentheses.
Source: Authors' estimates.

Table 3: Real per Capita GDP Growth Regression Results (financial indicator = stock market capitalization)

	(1)	(2)	(3)	(4)
Initial real per capita GDP	-8.734***	-8.501***	-8.550***	-8.686***
	(-6.358)	(-6.210)	(-6.108)	(-6.027)
Years of schooling	2.849	2.370	2.879	2.877
	(1.199)	(0.961)	(1.209)	(1.199)
Government spending, % of GDP	-3.492**	-3.723**	-3.525**	-3.502**
	(-2.367)	(-2.427)	(-2.370)	(-2.338)
Inflation	-0.790**	-0.799**	-0.751**	-0.791**
	(-2.251)	(-2.261)	(-2.114)	(-2.242)
Trade openness, % of GDP	3.366***	3.763***	3.395***	3.379***
	(2.871)	(3.399)	(2.907)	(2.819)
Governance	-0.175	-0.220	-0.174	-0.176
	(-0.938)	(-1.123)	(-0.961)	(-0.950)
Stock market capitalization, % of GDP	1.182***	0.677**	1.233***	1.178***
	(3.421)	(2.058)	(3.447)	(3.274)
Stock market x developing country dummy		0.606*		
		(1.813)		
Stock market x DMC dummy			-0.341	
			(-0.917)	
Stock market x postcrisis dummy				-0.020
				(-0.114)
Constant	62.749***	61.631***	61.112***	62.295***
	(5.898)	(5.991)	(5.772)	(5.485)
Observations	287	287	287	287
Number of economies	92	92	92	92
Adjusted R-squared	0.404	0.408	0.404	0.402

*** $p<0.01$, ** $p<0.05$, * $p<0.1$.
DMC = developing member country, GDP = gross domestic product.
Note: Robust t-statistics in parentheses.
Source: Authors' estimates.

**Table 4: Real per Capita GDP Growth Regression Results
(financial indicators = bank credit and stock market capitalization)**

	(1)	(2)	(3)	(4)
Initial real per capita GDP	-10.428***	-10.032***	-10.463***	-10.692***
	(-6.436)	(-6.263)	(-6.290)	(-6.075)
Years of schooling	3.219	2.534	3.284	3.093
	(1.343)	(1.013)	(1.379)	(1.279)
Government spending, % of GDP	-3.680***	-3.964***	-3.583***	-3.626***
	(-2.930)	(-3.216)	(-2.856)	(-2.848)
Inflation	-0.692**	-0.680**	-0.667**	-0.684**
	(-2.189)	(-2.154)	(-2.036)	(-2.107)
Trade openness, % of GDP	3.689***	4.148***	3.500***	3.635***
	(3.168)	(3.683)	(3.055)	(3.060)
Governance	-0.123	-0.169	-0.096	-0.116
	(-0.789)	(-1.015)	(-0.593)	(-0.728)
Private credit, % of GDP	1.916***	0.960	1.604*	1.945***
	(2.747)	(1.503)	(1.910)	(2.654)
Stock market capitalization, % of GDP	0.947***	0.617*	1.043***	0.967***
	(3.094)	(1.883)	(3.038)	-3.079
Private credit x developing country dummy		1.461		
		(1.550)		
Stock market x developing country dummy		0.372		
		(0.977)		
Private credit x DMC dummy			1.425	
			(1.330)	
Stock market x DMC dummy			-0.256	
			(-0.593)	
Private credit x postcrisis dummy				0.051
				(0.092)
Stock market x postcrisis dummy				0.043
				(0.078)
Constant	68.301***	66.559***	68.744***	70.556***
	(6.415)	(6.554)	(6.511)	(6.002)
Observations	287	287	287	287
Number of economies	92	92	92	92
Adjusted R-squared	0.449	0.461	0.450	0.446

*** p<0.01, ** p<0.05, * p<0.1.
DMC = developing member country, GDP = gross domestic product.
Note: Robust t-statistics in parentheses.
Source: Authors' estimates.

The control variables yield results consistent with the empirical growth literature and the magnitude of their coefficients are relatively stable over different specifications used in the regression analysis. Initial per capita GDP is found to have negative and significant effect on the growth of GDP per capita, indicating conditional convergence in terms of growth within the sample countries. Inflation and government size affect growth negatively, suggesting that macroeconomic instability and a relative small private sector are harmful for medium- to long-term growth. Education and trade have the expected significant and positive signs. However, the quality of governance indicator is found to be insignificant for medium- to long-term growth. This may reflect the inadequacy of executive constraint as a measure of governance, or at least governance that matters the most for growth. These results are robust over alternative regression specifications.

Our key variables of interest are the financial development indicators since the central question of our empirical analysis is the impact of financial development on growth. All the financial indicators are found to have a positive and significant effect on per capita GDP growth. Furthermore, the estimated magnitudes of the parameters tend to be stable across different model specifications and are within the range of parameter estimates found in previous studies. This finding is encouraging since it indicates the robustness of our estimated parameters, and hence, a lower risk that our estimates are biased.[1] Liquid liabilities, the broadest measure of financial depth, show strong positive and significant impact on growth.[2] The effects of two alternative measures of financial development, bank credit and stock market capitalization, are also both consistently positive and significant. Overall, our evidence is very much in line with the empirical literature, which suggests that financial sector development measured by financial depth plays an important role in growth. Our results also suggest that both the banking sector and capital markets are beneficial for both. Even when both bank credit and stock market capitalization are included as explanatory variables, they remain positive and significant. The results thus imply that it is overall financial development rather than financial structure or the relative weight of banks versus capital markets that matters for growth. Consequently, policy makers should prioritize their efforts on deepening the financial system as a whole instead of achieving better balance between its different components.

Is the effect of financial development different for countries with different levels of economic development? To address this question, we separate out high-income countries based on the World Bank classification, which are slightly more than 30% of our total cross-section sample, from the rest of the group in our sample (developing countries) and introduce a dummy variable for the latter. We interacted this dummy variable with our three measures of financial development to see if the effect of financial sector

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[1] Inclusion of financial development indicators in a growth regression is often criticized for its possible simultaneity problem. Essentially, this problem leads to a biased estimate for the parameters. Some authors tackled this issue by using an IV method to control for endogeneity (Levine et al. 2000, Beck and Levine 2004). The fact that our estimates are consistent with that found previously in the literature suggests that the bias, which could possibly be caused by the simultaneity problem in this case, is not a serious one.

[2] See Demirgüç-Kunt and Levine (2008) for a summary.

development is significantly different for developing countries. The results do not suggest any significant difference between the two groups of countries in terms of the effect of financial development on growth.

The next issue we address is whether financial development has a differential impact on developing Asian countries. To resolve this issue, we introduce a dummy variable that takes on the value of 1 for developing Asian countries and 0 for the rest of the sample. The coefficients of bank credit and stock market capitalization are not statistically significant. This implies that the effect of bank and capital market development is not noticeably stronger or weaker for the region than elsewhere. On the other hand, liquid liabilities, the broadest measure of financial depth, have a positive and significant effect on growth. This reinforces our central finding that what matters the most for growth is overall financial development.

The next issue is whether there has been a change in the effect of finance on growth in developing Asia since the Asian financial crisis. Our examination of the stylized facts indicated that there has been a noticeable slowdown of bank credit in the region since the crisis. To some extent, the slowdown reflected a reversal of the excessive lending and investment of the precrisis period and better risk management by banks in the postcrisis period. More broadly, the Asian crisis represents a major structural break in the region's financial systems due to their extensive restructuring and reform in the postcrisis period. The dummy variable for developing Asia is insignificant for all three financial development indicators. The Asian financial crisis, despite its far-reaching impact on the region's financial systems, does not seem to have affected the finance–growth nexus in the region. However, the inaccuracy of traditional indicators as a measure of financial development is a major problem here because they fail to capture the improvement of Asian banking system's soundness and efficiency since the Asian crisis.

We now report the results of baseline TFP growth regressions in Tables 5–8. The baseline regressions seek to explain TFP growth with the same sets of financial indicators and control variables that we used for the per capita GDP growth regressions, and do not include financial openness as an additional explanatory variable. The financial development indicators are total liquid liabilities for Table 5, bank credit for Table 6, and stock market capitalization for Table 7. Table 8 includes both bank credit and stock market capitalization as separate explanatory variables. In contrast to the per capita GDP growth regressions, we fail to find any evidence of a positive impact of financial development on TFP growth. All three financial development indicators—liquid liabilities, bank credit, and stock market capitalization—are found to be insignificant. On the face of it, this suggests that the primary contribution of financial development is through mobilization of savings for investment and capital accumulation rather than by fostering productivity and efficiency. This is plausible in view of the fact that the majority of our sample countries are developing countries. An important caveat to such an interpretation is that what matters for TFP growth is not so much financial deepening as measured by

the traditional indicators but the specific mechanisms through which financial systems. Therefore, a more accurate measure of financial development is required before we can more meaningfully assess the impact of financial development on TFP growth. By and large, the control variables have the expected signs and some of them are significant.[3]

Table 5: TFP Growth Regression Results
(financial indicator = total liquid liabilities)

	(1)	(2)	(3)	(4)
Initial TFP	-10.013***	-10.120***	-10.066***	-10.098***
	(-6.212)	(-6.110)	(-6.480)	(-6.495)
Years of schooling	-5.152***	-5.190***	-5.177***	-5.287***
	(-3.637)	(-3.601)	(-3.708)	(-3.763)
Government spending, % of GDP	-2.140**	-2.099**	-1.956*	-2.081**
	(-2.162)	(-2.119)	(-1.959)	(-2.064)
Inflation	-0.657***	-0.660***	-0.679***	-0.662***
	(-3.007)	(-3.011)	(-3.148)	(-3.043)
Trade openness, % of GDP	3.355***	3.342***	3.137***	3.299***
	(4.595)	(4.563)	(4.428)	(4.585)
Governance	-0.063	-0.051	-0.038	-0.055
	(-0.384)	(-0.309)	(-0.231)	(-0.332)
Liquid liabilities, % of GDP	0.092	1.021	-0.290	0.022
	(0.139)	(1.345)	(-0.413)	(0.034)
Liquid liabilities x developing country dummy		-1.160		
		(-1.115)		
Liquid liabilities x DMC dummy			1.612	
			(1.008)	
Liquid liabilities x postcrisis dummy				0.067
				(0.513)
Constant	46.455***	46.196***	47.402***	47.354***
	(4.842)	(4.840)	(5.333)	(5.283)
Observations	363	363	363	363
Number of economies	111	111	111	111
Adjusted R-squared	0.292	0.292	0.295	0.290

*** $p<0.01$, ** $p<0.05$, * $p<0.1$.
DMC = developing member country, GDP = gross domestic product, TFP = total factor productivity.
Note: Robust t-statistics in parentheses.
Source: Authors' estimates.

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[3] An exception is the negative and significant coefficient of education, which is puzzling and difficult to explain. However, when we run the between effects model, education becomes insignificant. In a between effects model, we control for the time-specific characteristics of a sample by transforming the data into its country means to estimate the parameters of interest. Consequently, we only exploit the country variations of the data to produce the regression results. When we run the least squares dummy variable (LSDV) model, education becomes positive and significant. The LSDV model uses dummy variables to produce specific intercepts for different time periods, while producing identical slopes of the nondummy independent variables. By doing so, the regression controls also control for time-specific characteristics of the data. The results for the between effects model and LSDV model are available from the authors upon request.

**Table 6: TFP Growth Regression Results
(financial indicator = bank credit)**

	(1)	(2)	(3)	(4)
Initial TFP	-9.864***	-9.833***	-9.825***	-10.001***
	(-5.651)	(-5.481)	(-5.581)	(-5.984)
Years of schooling	-4.968***	-4.964***	-4.909***	-5.173***
	(-3.085)	(-3.082)	(-2.996)	(-3.285)
Government spending, % of GDP	-2.044**	-2.066**	-1.991*	-1.994*
	(-2.050)	(-2.052)	(-1.973)	(-1.979)
Inflation	-0.663***	-0.663***	-0.665***	-0.666***
	(-3.176)	(-3.174)	(-3.191)	(-3.189)
Trade openness, % of GDP	3.396***	3.402***	3.330***	3.301***
	(4.632)	(4.590)	(4.684)	(4.600)
Governance	-0.058	-0.059	-0.051	-0.050
	(-0.365)	(-0.368)	(-0.322)	(-0.312)
Private credit, % of GDP	-0.142	-0.224	-0.219	-0.154
	(-0.294)	(-0.427)	(-0.397)	(-0.319)
Private credit x developing country dummy		0.113		
		(0.163)		
Private credit x DMC dummy			0.319	
			(0.312)	
Private credit x postcrisis dummy				0.098
				(0.736)
Constant	45.848***	45.789***	45.739***	47.059***
	(4.532)	(4.484)	(4.511)	(4.995)
Observations	363	363	363	363
Number of economies	111	111	111	111
Adjusted R-squared	0.292	0.290	0.291	0.292

*** p<0.01, ** p<0.05, * p<0.1.
DMC = developing member country, GDP = gross domestic product , TFP = total factor productivity.
Note: Robust t-statistics in parentheses.
Source: Authors' estimates.

**Table 7: TFP Growth Regression Results
(financial indicator = stock market capitalization)**

	(1)	(2)	(3)	(4)
Initial TFP	-11.106***	-11.055***	-11.076***	-11.155***
	(-5.819)	(-5.728)	(-5.812)	(-5.811)
Years of schooling	-5.075***	-5.132***	-5.016***	-5.179***
	(-2.701)	(-2.738)	(-2.698)	(-2.657)
Government spending, % of GDP	-2.127*	-2.184*	-2.138*	-2.122*
	(-1.919)	(-1.932)	(-1.907)	(-1.908)
Inflation	-0.430**	-0.435**	-0.411**	-0.431**
	(-2.255)	(-2.267)	(-2.165)	(-2.269)
Trade openness, % of GDP	4.622***	4.690***	4.649***	4.589***
	(5.192)	(5.223)	(5.338)	(5.019)
Governance	-0.256*	-0.264*	-0.254*	-0.255*
	(-1.737)	(-1.736)	(-1.743)	(-1.711)
Stock market capitalization, % of GDP	0.180	0.089	0.211	0.187
	(0.716)	(0.315)	(0.761)	(0.722)
Stock market x developing country dummy		0.119		
		(0.419)		
Stock market x DMC dummy			-0.156	
			(-0.473)	
Stock market x postcrisis dummy				0.026
				(0.224)
Constant	47.992***	47.901***	47.613***	48.508***
	(4.266)	(4.256)	(4.315)	(4.249)
Observations	268	268	268	268
Number of economies	87	87	87	87
Adjusted R-squared	0.395	0.393	0.393	0.393

*** $p<0.01$, ** $p<0.05$, * $p<0.1$.
DMC = developing member country, GDP = gross domestic product , TFP = total factor productivity.
Note: Robust t-statistics in parentheses.
Source: Authors' estimates.

**Table 8: TFP Growth Regression Results
(financial indicators = bank credit and stock market capitalization)**

	(1)	(2)	(3)	(4)
Initial TFP	-11.359***	-11.226***	-11.311***	-11.428***
	(-5.448)	(-5.386)	(-5.454)	(-5.393)
Years of schooling	-5.346***	-5.518***	-5.292***	-5.475***
	(-2.742)	(-2.873)	(-2.761)	(-2.678)
Government spending, % of GDP	-2.182*	-2.360**	-2.161*	-2.189*
	(-1.986)	(-2.244)	(-1.973)	(-1.967)
Inflation	-0.423**	-0.426**	-0.395**	-0.428**
	(-2.176)	(-2.164)	(-2.090)	(-2.178)
Trade openness, % of GDP	4.628***	4.694***	4.511***	4.592***
	(5.225)	(5.253)	(5.094)	(5.040)
Governance	-0.252*	-0.255*	-0.237	-0.251*
	(-1.739)	(-1.747)	(-1.655)	(-1.723)
Private credit, % of GDP	0.231	-0.426	0.037	0.247
	(0.435)	(-0.844)	(0.061)	(0.448)
Stock market capitalization, % of GDP	0.170	0.262	0.256	0.174
	(0.668)	(0.987)	(0.857)	(0.655)
Private credit x developing country dummy		1.075		
		(1.300)		
Stock market x developing country dummy		-0.095		
		(-0.290)		
Private credit x DMC dummy			0.844	
			(0.961)	
Stock market x DMC dummy			-0.244	
			(-0.722)	
Private credit x postcrisis dummy				-0.064
				(-0.152)
Stock market x postcrisis dummy				0.096
				(0.229)
Constant	48.931***	49.084***	48.865***	49.589***
	(4.182)	(4.266)	(4.316)	(4.129)
Observations	268	268	268	268
Number of economies	87	87	87	87
Adjusted R-squared	0.393	0.395	0.392	0.389

*** $p<0.01$, ** $p<0.05$, * $p<0.1$.
DMC = developing member country, GDP = gross domestic product , TFP = total factor productivity.
Note: Robust t-statistics in parentheses.
Source: Authors' estimates.

In addition to the baseline regressions, we ran regressions that are identical to the baseline regressions except that we added financial openness—empirically measured by the ratio of total capital inflows to GDP—as an additional explanatory variable for per capita GDP growth. Financial openness and financial development are separate concepts and it is possible for countries to be financially open but underdeveloped or vice versa. However, there are potentially important channels for financial openness to have a positive influence on financial development. For example, underdeveloped Asian bond markets are likely to benefit from an influx of foreign institutional investors with a wealth of experience and knowledge. On the downside, potentially short-term capital inflows can be a major source of instability in the financial markets that can have adverse effects on financial development. Furthermore, financial openness, especially but not only foreign direct investment, can have a direct positive effect on the real economy by bringing in advanced technology and know-how as well as fostering greater competition in domestic markets. For all of these reasons, it is worthwhile to explore the effect of financial openness even though it is distinct from financial development.

Tables 9–12 report the results of those per capita GDP growth regressions. Financial development indicators are total liquid liabilities for Table 9, bank credit for Table 10, and stock market capitalization for Table 11. Table 12 includes both bank credit and stock market capitalization as separate explanatory variables. We also interacted financial openness with dummy variables for developing countries, developing Asian countries, and post-Asian crisis period for developing Asian countries. Across most specifications and for all three measures of financial development, financial openness has a positive and significant effect on growth. The only exception is Table 12 where both bank credit and stock market capitalization are included as explanatory variables. Furthermore, the inclusion of financial openness does not change our results for the three indicators of financial development, which remain positive and significant. Therefore, according to our evidence, both financial development and financial openness are beneficial for growth. Our results also suggest that financial openness has a greater positive growth impact for developing countries than industrialized countries. In the latter, the high initial degree of openness is likely to be high, which may limit further opening as well as marginal returns to opening. Turning to developing Asian countries, total liquid liabilities remain the only financial variable showing a difference from the rest of the sample, lending further support to the notion that overall financial deepening matters more the most for Asian growth. For Asian countries in the post-Asian crisis period, financial openness has a significantly more positive effect in the postcrisis period. On the other hand, two financial development indicators—liquid liabilities and bank credit—have a significantly more negative effect but this probably reflects correction of excesses in the precrisis period. Overall, our relatively robust findings of a beneficial effect of financial openness for growth call for careful and selective design and implementation of any restrictions against capital inflows.

Table 9: Real per Capita GDP Growth Regression Results, Financial Openness Included (financial indicator = total liquid liabilities)

	(1)	(2)	(3)	(4)
Initial real per capita GDP	-9.049***	-8.835***	-9.536***	-8.687***
	(-7.031)	(-6.563)	(-8.352)	(-6.808)
Years of schooling	2.930**	2.623*	3.130**	2.896**
	(2.203)	(1.916)	(2.406)	(2.152)
Government spending, % of GDP	-4.270***	-4.374***	-3.773***	-3.845***
	(-4.054)	(-4.197)	(-3.658)	(-3.967)
Inflation	-1.222***	-1.198***	-1.243***	-1.100***
	(-3.946)	(-3.895)	(-4.182)	(-4.288)
Trade openness, % of GDP	2.358**	2.407**	1.975*	2.472**
	(2.173)	(2.240)	(1.864)	(2.519)
Governance	-0.101	-0.107	-0.026	-0.076
	(-0.722)	(-0.746)	(-0.187)	(-0.569)
Capital inflows, % of GDP	0.646***	0.346**	0.656***	0.571***
	(3.503)	(2.077)	(3.559)	(3.108)
Liquid liabilities, % of GDP	2.749***	2.802**	1.910**	2.426***
	(3.772)	(2.301)	(2.362)	(3.393)
Capital inflows x developing country dummy		0.446*		
		(1.866)		
Capital inflows x DMC dummy			0.253	
			(0.567)	
Capital inflows x postcrisis dummy				1.537**
				(2.186)
Liquid liabilities x developing country dummy		-0.086		
		(-0.063)		
Liquid liabilities x DMC dummy			3.301**	
			(2.301)	
Liquid liabilities x postcrisis dummy				-1.944**
				(-2.108)
Observations	385	385	385	385
Adjusted R-squared	0.447	0.448	0.462	0.472
Number of economies	116	116	116	116

*** $p<0.01$, ** $p<0.05$, * $p<0.1$.
DMC = developing member country, GDP = gross domestic product.
Note: Robust t-statistics in parentheses.
Source: Authors' estimates.

Table 10: Real per Capita GDP Growth Regression Results, Financial Openness Included (financial indicator = bank credit)

	(1)	(2)	(3)	(4)
Initial real per capita GDP	-9.377***	-9.125***	-9.728***	-9.231***
	(-6.129)	(-5.889)	(-6.583)	(-5.980)
Years of schooling	2.818**	2.419*	2.931**	2.502*
	(2.170)	(1.800)	(2.220)	(1.821)
Government spending, % of GDP	-4.355***	-4.540***	-4.288***	-3.731***
	(-4.381)	(-4.568)	(-4.247)	(-4.088)
Inflation	-1.310***	-1.278***	-1.345***	-1.148***
	(-4.183)	(-4.138)	(-4.412)	(-4.790)
Trade openness, % of GDP	2.974***	3.041***	2.900***	2.726***
	(2.661)	(2.744)	(2.635)	(2.646)
Governance	-0.056	-0.071	-0.032	-0.016
	(-0.433)	(-0.537)	(-0.245)	(-0.122)
Capital inflows, % of GDP	0.609***	0.301	0.506***	0.592***
	(3.300)	(1.610)	(2.686)	(3.121)
Capital inflows x developing country dummy		0.469*		
		(1.800)		
Capital inflows x DMC dummy			0.754	
			(1.499)	
Capital inflows x postcrisis dummy				1.300**
				(2.050)
Private credit, % of GDP	1.672***	1.409*	1.590**	1.644***
	(2.925)	(1.845)	(2.392)	(2.761)
Private credit x DMC dummy			0.399	
			(0.379)	
Private credit x postcrisis dummy				-1.622*
				(-1.834)
Private credit x developing country dummy		0.389		
		(0.436)		
Observations	385	385	385	385
Adjusted R-squared	0.447	0.451	0.455	0.478
Number of economies	116	116	116	116
Robust t-statistics in parentheses				

*** $p<0.01$, ** $p<0.05$, * $p<0.1$
DMC = developing member country, GDP = gross domestic product.
Source: Authors' estimates.

Table 11: Real per Capita GDP Growth Regression Results, Financial Openness Included (financial indicator = stock market capitalization)

	(1)	(2)	(3)	(4)
Initial real per capita GDP	-8.902***	-8.479***	-8.745***	-8.906***
	(-6.338)	(-5.941)	(-6.114)	(-6.019)
Years of schooling	2.675	1.885	2.614	2.581
	(1.179)	(0.796)	(1.131)	(1.100)
Government spending, % of GDP	-3.319**	-3.595**	-3.404**	-3.291**
	(-2.274)	(-2.365)	(-2.305)	(-2.258)
Inflation	-0.794**	-0.801**	-0.772**	-0.788**
	(-2.327)	(-2.378)	(-2.221)	(-2.314)
Trade openness, % of GDP	3.044**	3.373***	3.040***	3.050**
	(2.614)	(3.055)	(2.632)	(2.538)
Governance	-0.157	-0.196	-0.153	-0.148
	(-0.876)	(-1.039)	(-0.905)	(-0.816)
Capital inflows, % of GDP	0.344*	0.163	0.264	0.331*
	(1.745)	(0.978)	(1.145)	(1.676)
Capital inflows x developing country dummy		0.418		
		(1.206)		
Capital inflows x DMC dummy			0.340	
			(0.858)	
Capital inflows x postcrisis dummy				0.202
				(0.365)
Stock market capitalization	1.043***	0.638*	1.137***	1.054***
	(2.931)	(1.972)	(2.986)	(2.863)
Stock market x DMC dummy			-0.500	
			(-1.074)	
Stock market x postcrisis dummy				-0.277
				(-0.355)
Stock market x developing country dummy		0.425		
		(1.111)		
Observations	287	287	287	287
Adjusted R-squared	0.411	0.419	0.410	0.408
Number of economies	92	92	92	92

DMC = developing member country, GDP = gross domestic product.
Source: Authors' estimates.

Table 12: Real per Capita GDP Growth Regression Results, Financial Openness Included, (financial indicators = bank credit and stock market capitalization)

	(1)	(2)	(3)	(4)
Initial real per capita GDP	-10.516***	-9.976***	-10.561***	-10.836***
	(-6.362)	(-5.977)	(-6.260)	(-5.946)
Years of schooling	3.065	2.113	3.123	2.891
	(1.329)	(0.875)	(1.348)	(1.225)
Government spending, % of GDP	-3.532***	-3.836***	-3.451***	-3.462***
	(-2.828)	(-3.121)	(-2.724)	(-2.696)
Inflation	-0.698**	-0.686**	-0.678**	-0.689**
	(-2.259)	(-2.275)	(-2.081)	(-2.124)
Trade openness, % of GDP	3.414***	3.797***	3.247***	3.340***
	(2.927)	(3.312)	(2.819)	(2.783)
Governance	-0.110	-0.151	-0.085	-0.100
	(-0.723)	(-0.936)	(-0.532)	(-0.646)
Capital inflows, % of GDP	0.283	0.182	0.263	0.291
	(1.436)	(0.983)	(1.144)	(1.414)
Private credit, % of GDP	1.860***	0.885	1.575*	1.893**
	(2.652)	(1.431)	(1.860)	(2.565)
Stock market capitalization, % of GDP	0.839***	0.561	0.934***	0.860***
	(2.776)	(1.618)	(2.712)	(2.788)
Capital inflows x developing country dummy		0.314		
		(0.909)		
Private credit x developing country dummy		1.468		
		(1.581)		
Stock market x developing country dummy		0.249		
		(0.635)		
Capital inflows x DMC dummy			0.031	
			(0.079)	
Private credit x DMC dummy			1.325	
			(1.120)	
Stock market x DMC dummy			-0.231	
			(-0.502)	
Capital inflows x postcrisis dummy				0.035
				(0.062)
Private credit x postcrisis dummy				0.034
				(0.045)
Stock market x postcrisis dummy				0.032
				(0.055)
Constant	68.972***	66.595***	69.535***	71.736***
	(6.321)	(6.302)	(6.366)	(5.935)
Observations	287	287	287	287
Number of economies	92	92	92	92
Adjusted R-squared	0.453	0.469	0.452	0.448

*** p<0.01, ** p<0.05, * p<0.1.
DMC = developing member country, GDP = gross domestic product.
Note: Robust t-statistics in parentheses.
Source: Authors' estimates.

We now turn to the results of TFP growth regressions that include financial openness. Tables 13–16 seek to explain TFP growth with the same sets of financial indicators and control variables that we used for the baseline regressions, but we include financial openness as an additional explanatory variable. By and large, the control variables have the expected signs and some of them are significant. The financial development indicators are total liquid liabilities for Table 13, bank credit for Table 14, and stock market capitalization for Table 15. Table 16 includes both bank credit and stock market capitalization as separate explanatory variables. The coefficients of financial openness are positive and significant regardless of the financial development indicator and across most specifications. This implies that financial openness has a significant positive effect on TFP growth. This is consistent with the findings of some earlier studies (e.g., Levine 2001). Foreign investment often brings in new technology and skills, and forces domestic firms and industries to become more efficient. On the other hand, the coefficients of all three financial development indicators remain insignificant, as they were in the baseline TFP growth regressions without financial openness. Therefore, the overall evidence in Tables 13–16 implies that financial openness may exert a larger effect on TFP growth than financial development. This is intuitively plausible in light of the fact that foreign investment has a direct effect on the productivity of domestic firms and industries, e.g., by exposing them to greater competition; whereas the effect of financial development is more indirect, e.g., via a more sound and efficient financial system.

Table 13: TFP Growth Regression Results, Financial Openness Included (financial indicator = total liquid liabilities)

	(1)	(2)	(3)	(4)
Initial TFP	-10.889***	-10.769***	-10.962***	-11.236***
	(-6.131)	(-5.811)	(-6.596)	(-6.941)
Years of schooling	-6.294***	-6.339***	-6.324***	-6.715***
	(-4.001)	(-4.021)	(-4.159)	(-4.397)
Government spending, % of GDP	-2.019**	-2.022**	-1.749*	-1.881**
	(-2.205)	(-2.226)	(-1.857)	(-2.024)
Inflation	-0.559***	-0.551***	-0.558***	-0.533***
	(-3.138)	(-3.163)	(-3.204)	(-2.965)
Trade openness, % of GDP	2.641***	2.680***	2.333***	2.465***
	(3.394)	(3.421)	(3.033)	(3.188)
Governance	-0.071	-0.063	-0.042	-0.059
	(-0.454)	(-0.398)	(-0.272)	(-0.366)
Capital inflows, % of GDP	0.503***	0.277	0.559***	0.578***
	(3.369)	(1.211)	(3.587)	(3.893)
Liquid liabilities, % of GDP	0.041	1.072	-0.440	-0.107
	(0.057)	(1.360)	(-0.557)	(-0.151)
Capital inflows x developing country dummy		0.285		
		(1.157)		
Capital inflows x DMC dummy			-0.246	
			(-1.150)	
Capital inflows x postcrisis dummy				-0.754
				(-1.379)
Liquid liabilities x developing country dummy		-1.217		
		(-1.068)		
Liquid liabilities x DMC dummy			2.300	
			(1.268)	
Liquid liabilities x postcrisis dummy				1.146
				(1.540)
Observations	363	363	363	363
Number of economies	111	111	111	111
Adjusted R-squared	0.322	0.321	0.326	0.328

*** $p<0.01$, ** $p<0.05$, * $p<0.1$.
DMC = developing member country, GDP = gross domestic product , TFP = total factor productivity.
Note: Robust t-statistics in parentheses.
Source: Authors' estimates.

Table 14: TFP Growth Regression Results, Financial Openness Included (financial indicator = bank credit)

	(1)	(2)	(3)	(4)
Initial TFP	-10.716***	-10.593***	-10.670***	-11.215***
	(-5.644)	(-5.380)	(-5.565)	(-6.581)
Years of schooling	-6.088***	-6.125***	-6.018***	-6.540***
	(-3.440)	(-3.495)	(-3.311)	(-3.887)
Government spending, % of GDP	-1.917**	-1.975**	-1.852*	-1.922**
	(-2.076)	(-2.131)	(-1.937)	(-2.092)
Inflation	-0.564***	-0.557***	-0.565***	-0.534***
	(-3.322)	(-3.351)	(-3.296)	(-3.114)
Trade openness, % of GDP	2.668***	2.691***	2.589***	2.557***
	(3.388)	(3.391)	(3.350)	(3.362)
Governance	-0.067	-0.071	-0.059	-0.070
	(-0.436)	(-0.456)	(-0.386)	(-0.448)
Capital inflows, % of GDP	0.506***	0.411**	0.509***	0.564***
	(3.417)	(2.009)	(3.081)	(3.988)
Capital inflows x developing country dummy		0.133		
		(0.586)		
Capital inflows x DMC dummy			-0.013	
			(-0.049)	
Capital inflows x postcrisis dummy				-0.696
				(-1.413)
Private credit, % of GDP	-0.185	-0.295	-0.275	-0.173
	(-0.389)	(-0.542)	(-0.481)	(-0.381)
Private credit x developing country dummy		0.184		
		(0.250)		
Private credit x DMC dummy			0.380	
			(0.367)	
Private credit x postcrisis dummy				1.152
				(1.628)
Observations	363	363	363	363
Number of economies	111	111	111	111
Adjusted R-squared	0.323	0.320	0.319	0.331

DMC = developing member country, GDP = gross domestic product , TFP = total factor productivity.
Source: Authors' estimates.

Table 15: TFP Growth Regression Results, Financial Openness Included (financial indicator = stock market capitalization)

	(1)	(2)	(3)	(4)
Initial TFP	-11.358***	-11.021***	-11.330***	-11.439***
	(-5.814)	(-5.551)	(-5.933)	(-5.800)
Years of schooling	-5.566***	-5.622***	-5.369***	-5.742***
	(-2.951)	(-3.136)	(-2.871)	(-2.945)
Government spending, % of GDP	-2.069*	-2.118*	-2.021*	-2.056*
	(-1.872)	(-1.863)	(-1.785)	(-1.862)
Inflation	-0.443**	-0.464**	-0.402**	-0.445**
	(-2.326)	(-2.476)	(-2.071)	(-2.341)
Trade openness, % of GDP	4.364***	4.342***	4.466***	4.307***
	(4.693)	(4.524)	(4.940)	(4.489)
Governance	-0.234	-0.225	-0.235	-0.231
	(-1.649)	(-1.559)	(-1.593)	(-1.608)
Capital inflows, % of GDP	0.290*	0.027	0.380**	0.293*
	(1.708)	(0.139)	(2.173)	(1.681)
Capital inflows x developing country dummy		0.445		
		(1.547)		
Capital inflows x DMC dummy			-0.366	
			(-1.238)	
Capital inflows x postcrisis dummy				0.015
				(0.051)
Stock market capitalization, % of GDP	0.066	0.161	0.024	0.076
	(0.300)	(0.525)	(0.099)	(0.333)
Stock market x developing country dummy		-0.150		
		(-0.450)		
Stock market x DMC dummy			0.096	
			(0.216)	
Stock market x postcrisis dummy				0.021
				(0.050)
Observations	268	268	268	268
Number of economies	87	87	87	87
Adjusted R-squared	0.402	0.404	0.401	0.398

DMC = developing member country, GDP = gross domestic product , TFP = total factor productivity.
Source: Authors' estimates.

**Table 16: TFP Growth Regression Results
(financial indicators = bank credit and stock market capitalization)**

	(1)	(2)	(3)	(4)
Initial TFP	-11.546***	-11.187***	-11.553***	-11.637***
	(-5.480)	(-5.275)	(-5.706)	(-5.394)
Years of schooling	-5.762***	-5.968***	-5.561***	-5.953***
	(-2.921)	(-3.173)	(-2.905)	(-2.888)
Government spending, % of GDP	-2.112*	-2.281**	-2.019*	-2.110*
	(-1.919)	(-2.134)	(-1.823)	(-1.891)
Inflation	-0.438**	-0.456**	-0.370*	-0.444**
	(-2.258)	(-2.359)	(-1.895)	(-2.131)
Trade openness, % of GDP	4.374***	4.353***	4.338***	4.316***
	(4.726)	(4.535)	(4.757)	(4.504)
Governance	-0.231	-0.219	-0.216	-0.229
	(-1.654)	(-1.596)	(-1.483)	(-1.601)
Capital inflows, % of GDP	0.285	0.071	0.393**	0.285
	(1.631)	(0.374)	(2.196)	(1.592)
Private credit, % of GDP	0.175	-0.450	-0.008	0.189
	(0.332)	(-0.899)	(-0.013)	(0.343)
Stock market capitalization, % of GDP	0.061	0.298	0.069	0.067
	(0.276)	(1.038)	(0.278)	(0.280)
Capital inflows x developing country dummy		0.386		
		(1.294)		
Private credit x developing country dummy		1.039		
		(1.272)		
Stock market x developing country dummy		-0.315		
		(-0.956)		
Capital inflows x DMC dummy			-0.519	
			(-1.466)	
Private credit x DMC dummy			1.113	
			(1.062)	
Stock market x DMC dummy			0.069	
			(0.165)	
Capital inflows x postcrisis dummy				0.029
				(0.053)
Private credit x postcrisis dummy				-0.074
				(-0.093)
Stock market x postcrisis dummy				0.080
				(0.186)
Constant	50.315***	49.648***	49.346***	51.244***
	(4.145)	(4.179)	(4.300)	(4.111)
Observations	268	268	268	268
Number of economies	87	87	87	87
Adjusted R-squared	0.400	0.406	0.401	0.394

*** p<0.01, ** p<0.05, * p<0.1.
DMC = developing member country, GDP = gross domestic product , TFP = total factor productivity.
Note: Robust t-statistics in parentheses.
Source: Authors' estimates.

C. Overall Summary of Empirical Results

The most significant finding from our empirical analysis is a significant and positive effect of financial development on real per capita GDP growth. Regardless of which measure of financial depth we use, whether total liquid liabilities, bank credit, or stock market capitalization, we find a consistently positive and significant impact on growth across all specifications. Our evidence is consistent with the bulk of the existing empirical literature. Furthermore, our control variables have the expected signs and many are significant, a fact that lends further support to the robustness of our results. Our central finding that bank development, capital market development, and total liquid liabilities of the financial system are all beneficial for growth suggests that what matters for growth is overall financial deepening rather than the structure of the financial system. Therefore, the balance between banks and capital markets matter much less for growth than well-functioning banks *and* capital markets. We do not find any evidence of significant differences between developing countries and industrialized countries in terms of the finance–growth nexus. For the developing Asian countries, we find that total liquid liabilities have a bigger impact on growth than in the rest of our sample. This further accentuates the importance of overall financial development, as opposed to financial structure, as a significant contributor to growth. A control variable of particular interest to us is financial openness. Our evidence strongly indicates that financial openness has a positive and significant effect on real per capita GDP growth. Therefore, according to the results of our empirical analysis, both financial development and financial openness are beneficial for growth. Our TFP growth regressions fail to yield any evidence of a positive effect of financial development. This result may be due to the measurement problems associated with traditional financial development indicators, which fail to capture the specific channels through which financial systems promote efficiency and productivity in an economy. We find that financial openness, in contrast to financial development, has a significant and positive effect on TFP growth. We also find that financial openness has a bigger growth effect for developing countries. Finally, in developing Asian countries in the post-Asian crisis period, the impact of financial openness on growth has become larger than in the rest of the world while the impact of financial development has become somewhat smaller.

V. Concluding Observations and Policy Implications

Our empirical analysis yields evidence that is strongly supportive of a positive influence of financial development on economic growth. Our findings indicate that overall financial development, as well as bank development and stock market development, all exert a significant positive effect on real per capita GDP growth. The evidence is robust and consistent across different specifications for both developed and developing countries. All

the control variables have the expected signs and many of them are significant. Overall, our results are very much in line with existing empirical literature, most of which uncover a positive relationship between finance and growth. Our evidence is also consistent with economic theory, which throws up a number of intuitively plausible rationales for why well-functioning financial systems matter for growth. These include producing information and allocating capital; monitoring firm behavior and exerting corporate governance; facilitating the hedging, trading, and pooling of risk; mobilizing savings for investment; and reducing the transactions costs of economic exchange and activity. An accurate measure of financial development would capture how well the banks and stock and bond markets perform the above growth-promoting functions. However, following the existing empirical literature, we use the traditional, highly imperfect measures of financial development. Such measurement problems may help to explain why we fail to find any evidence of a positive influence of financial development on TFP growth. Developing empirical measures of financial development that are more closely aligned with the theoretical concept of financial development remains a vital area for future research.

Our empirical analysis produces two important results especially relevant for developing Asia. The first result is that the total liquid liabilities of the financial system have a bigger impact on developing Asia's growth than in other parts of the world. Overall financial development matters more for the region than other regions, but the impact of bank and stock market development on developing Asia's growth is not appreciably different from its impact on the growth of other regions. This suggests that what matters for the region's growth is not the development of particular components of the financial system but the development of the financial system as a whole. Our evidence is consistent with one of the key findings of the empirical literature, namely that overall financial development matters much more for growth than the structure of the financial system, i.e., relative weight of banks versus equity and bond markets. The second result is that there seems to have been a sharp drop-off in the effect of finance on growth since the Asian financial crisis. On the face of it, this would suggest that financial development matters less for growth in the post-Asian crisis period. However, the more plausible interpretation is that the apparent structural change reflects a reversion of overlending and overinvestment in the precrisis period to more sustainable levels of lending and investment. It would take a leap of faith to view a banking boom characterized by reckless lending and rapidly deteriorating quality of investment as financial development. Such booms are typically followed by banking busts that inflict hardship on the real economy. The Asian crisis, which was a classical example of such boom-bust cycles, underlines the measurement problems associated with the traditional empirical proxies for financial development.

The marked decline in the contribution of financial development to economic growth since the Asian crisis also highlights another important point. While the returns to investment and, by extension, the returns to financial development that mobilizes large quantities of savings to finance large amounts of investments, tend to be high at lower-income levels, they both tend to fall as a country accumulates a larger capital stock of capital

over time. In a fundamental sense, the Asian crisis highlighted the risks of a failure to shift from a growth based on inputs and factor accumulation to an alternative growth path based on productivity gains. Maintaining very high investment rates when the economy has already built up a large capital stock leads to unsustainable overinvestment. This may characterize the situation of the crisis-hit middle- and upper middle-income East and Southeast Asian countries prior to the Asian crisis. While a financial system that is good at mobilizing savings for investment is essential for economic success for poor, low-income countries, a financial system that is good at promoting static and dynamic efficiency improvements becomes increasingly more important as countries grow richer. Put differently, over time the primary contribution of financial development to growth shifts from augmenting the quantity of investment to lifting up the efficiency of investment. A financial system has to evolve along with a country's overall development level in order to contribute to growth on a sustained basis. To some extent, the decline in the contribution of financial development since the Asian crisis could reflect the fact that the evolution is still incomplete.

One control variable that is of particular interest to us is financial openness, which is empirically proxied by capital inflows as share of GDP. Financial openness is of particular interest since financial globalization contributed to the Asian crisis and the prospect of large capital inflows has reignited serious discussion of capital controls across the region. Our results yield robust and consistent evidence of a significant positive influence of financial openness on economic growth. In addition to augmenting the supply of savings available for investment, foreign investors often bring in new technology, management, and know-how that boost the domestic economy's productivity and efficiency. The productivity spill-over effect is likely to dominate the savings augmentation effect in light of developing Asia's abundance of savings. Indeed, our results indicate that financial openness has a significant positive effect on TFP growth. While financial openness and financial development are separate concepts, the two are not completely independent of each other. In particular, foreign investment in domestic financial institutions and markets can foster financial development. For example, the entry of world-class foreign banks into the domestic banking market forces domestic banks to raise their game. Likewise, foreign institutional investors bring a wealth of expertise, experience, and knowledge to the region's underdeveloped bond markets, and thereby speed up its development. On the other hand, foreign capital can be a major source of instability. This is especially true for potentially volatile short-term portfolio investments that can easily be withdrawn and reversed.

There are a number of key messages which emerge from our empirical analysis for developing Asia's policymakers. Above all, our central finding that financial development has a positive, significant effect on growth, suggesting that financial development will be a key ingredient of the region's medium- and long-run growth. The obvious corollary is that policy efforts seeking to further strengthen and improve the region's financial systems will yield dividends for growth. In addition, our evidence indicates that what matters more

for developing Asia is overall financial development rather than development of particular components of the financial system. Therefore, the region's policymakers should concentrate their efforts on institutional and policy reforms benefiting the financial system as a whole, rather than concern themselves about the relative weight of banks versus capital markets. Put differently, the most effective institutions and policies for promoting financial development are those that have a positive influence on both banks and capital markets. More specifically, the region needs to continue to build a better institutional infrastructure, which consists of two main components: effective legal and regulatory frameworks, and best-practice accounting and auditing standards and practices. A better infrastructure is conducive for the provision of timely and accurate information, effective exercise of corporate governance, and adequate risk management. For example, strengthening shareholder and creditor rights strengthens corporate governance. A sound institutional infrastructure benefits the entire financial system and thus facilitates overall financial development.

Second, the global financial crisis underlined the devastating impact that financial instability can wreak on the real economy, even in large, advanced economies such as the EU and the US. The sharpest slowdown of global economic activity and trade in the postwar period originated in glaring market failures in supposedly the world's most advanced financial markets. This should put to rest any doubts about the importance of financial stability for growth. Closer to home, many countries in developing Asia witnessed firsthand the daunting power of financial turbulence to paralyze the real economy, even in the world's fastest-growing economies, during the Asian financial crisis. The inescapable implication for Asian policymakers is that safeguarding financial stability is paramount for sustaining medium- and long-run growth. The most direct means of safeguarding financial stability is to prudential regulation and supervision, and there has been a lot of progress on this front since the Asian crisis. Another important means of furthering financial stability is to accelerate the development of the region's relatively less developed bond markets compared to the other major components of developing Asia's financial systems, i.e., banks and equity markets. In particular, while the region's government bond markets have grown substantially since the Asian crisis, catalyzed initially by the recapitalization of banks, the corporate bond markets remain generally small, underdeveloped, and confined to specific sectors such as infrastructure and energy. The primary benefit of a more diversified financial structure is not so much growth but greater stability, robustness, and resilience during negative shocks. However, as the global and Asian crises show, financial stability can have enormous implications for growth. Policy measures to invigorate the bond markets should aim to encourage greater availability of timely and relevant information, reduce transactions costs, and broaden the investor base. Given the underdevelopment of domestic pension funds, life insurance companies, and other institutional investors with long-term horizons, greater participation of foreign institutional investors will help to augment liquidity in the short run. Finally, well-functioning bond markets have the important added benefit of providing stable and secure source of long-term capital for growth.

Third, expanding and improving access to financial services for both householders and producers will remain a key policy priority for financial development. Aggregate financial depth indicators such as the ratio of bank credit to GDP can hide substantial disparities across the population of individuals and firms in the economy. For example, a large part of the poor and rural population may lack access to banks and other formal finance when the financial system is confined to the urban middle class. Likewise, large private corporations and state-owned enterprises may enjoy good access to finance while SMEs and individual entrepreneurs may suffer financial exclusion. Financial access matters for medium- and long-run growth primarily because it promotes equality of opportunity. For example, poor but talented individuals will be unable to invest in their education or start up new businesses if they do not have access to credit.

Furthermore, access to finance promotes the entry of new firms and innovative activities, thereby stimulating competition and efficiency. The role of financial system in allocating capital to its most productive uses inevitably suffers when large parts of the economy lie outside the financial system. Entrepreneurship is often frustrated and good business plans never materialize. Overall access to finance in developing Asia remains substantially below that of the industrialized countries. Promoting equality of opportunity, policies, and institutions that expand the reach of finance in the region will help to bring about a more inclusive growth with lower poverty and inequality. Specific examples of such policies and institutions include setting up credit registries that allow lenders to share information about their clients' repayment records and reducing the transaction costs associated with repossessing collateral in the event of default (World Bank 2008).

Fourth, speeding up the integration of developing Asia's financial markets, especially bond markets, can yield substantial gains for the region's financial development. Even among subregions where trade integration has reached fairly high levels, most notably East and Southeast Asia, the level of financial integration remains low. This suggests that strengthening regional financial integration is an important means of furthering overall financial openness, which is beneficial to growth according to our evidence. Regional financial integration can confer a number of important benefits for the region. Above all, regional financial integration creates bigger, broader, deeper, more liquid and more efficient financial markets, a benefit that is especially relevant for the region's small, illiquid, and fragmented bond markets. Greater integration of those bond markets will enable the region to reap large benefits from economies of scale. Integration can also speed up regional intermediation of the large regional pool of savings, provide resilience against shocks, diversify the investor base, and allow for sharing of idiosyncratic risk across countries. According to Ghosh (2006), while cross-border restrictions have come down sharply across the region, a wide range of impediments still stand in the way of free capital flows. These include withholding taxes, lack of hedging instruments; differences in market practices and infrastructure; and differences in credit rating, legal and regulatory systems, and accounting and auditing standards. There are a number of policy options to speed up financial integration among Asian countries, including closer regional

cooperation to remove remaining obstacles to cross-border investment; creating regional financial products such as regional index funds; and addressing differences in credit rating, accounting and auditing standards, as well as legal and regulatory frameworks; and setting up a regional credit rating agency that would help improve assessment of credit risk.

Fifth, financial development requires very different institutional and policy reforms in different developing Asian countries since they are at very different levels of economic, institutional, and financial development. Developing Asia is a highly heterogeneous region encompassing a diverse mix of countries, ranging from some of the world's poorest economies to economies that are approaching rich-world incomes. Quite predictably, there is a great deal of heterogeneity in the level of financial development, ranging from rudimentary financial systems to highly sophisticated financial centers such as Hong Kong, China and Singapore. Some of our policy messages, such as the need to strengthen the institutional infrastructure of the financial system, remain relevant and applicable to the entire region, notwithstanding such diversity. At the same time, the diversity of financial needs means that the role of the financial system in economic growth will differ substantially across countries. For example, while the relative importance of mobilizing savings for investment is likely to decline for developing Asia as a whole, it will remain important in lower-income countries where high investment and capital accumulation still matters a lot for growth. In lower-income countries, building up a well-functioning banking system takes precedence over diversifying financial structure with stock and equity markets. The dilemma of the extent to which risk transfer and sharing instruments such as derivatives and securitization should be permitted is much more germane to the financially more developed economies, as is the issue of desirability and feasibility of greater financial integration.

A critical issue facing developing Asia's prudential regulation and supervision authorities in the aftermath of the global financial crisis is the extent to which they should allow new financial products, services, and technologies—i.e., the speed and scope of financial innovation. If financial innovation can wreak such havoc on big, deep, broad, liquid, and sophisticated financial markets such as that of the EU and the US, it may be tempting for financially underdeveloped Asian countries to conclude that they promote financial innovation at their own risk. However, financial backwardness, which fortuitously protected Asia this time around, entails potentially large costs of its own, as the Asian crisis made all too clear. As Prasad (2010) points out, regulatory challenges facing emerging markets are more about risks of having underdeveloped financial systems rather than risks from sophisticated financial innovations. Furthermore, developing Asia's banks have already reaped substantial benefits from innovations of their own, including moving into new business activities such as investment banking, household lending and real estate, and producing a wider range of products and services. It is not financial innovation itself but rather the complete failure of prudential regulators to identify and control the risks stemming from innovation, along with their failure to provide incentives for financial

institutions to exercise proper risk management that triggered the global financial crisis. It may thus be more productive for Asian authorities to apply the lessons learned from the crisis, e.g., what are the specific risks in financial innovation, to their financial reform process and to provide market players with the appropriate incentives for risk management. The global crisis may even benefit the financial reform process in Asia by enabling the region to avoid the regulatory mistakes of the EU and the US.

In conclusion, it should first be noted that developing Asia has come a long way in terms of financial development since the Asian financial crisis. That crisis served as a wake-up call for far-reaching reform and restructuring that greatly improved the financial health and performance of the region's banking system, which remains the mainstay of its financial system. The region's financial system has also become more diversified as a result of the rapid growth of its equity markets, and to a lesser extent, its bond markets. Furthermore, prudential regulation and supervision systems have been strengthened to be more flexible and adaptable to changing conditions. As a result of these positive developments, the region's financial systems have become substantially more robust and efficient, a fact which, together with their limited exposure to subprime assets, has protected the region from the financial turbulence that devastated their counterparts in financially more advanced economies. However, despite the great deal of progress, there is still significant scope for further improving the robustness and efficiency of the region's financial systems. In particular, building a better institutional infrastructure for the financial system as a whole; and bigger, broader, deeper, more liquid, and more sophisticated bond markets, especially corporate bond markets, will yield returns for economic growth both directly and indirectly through enhanced financial stability. Expanding access to finance to more households and producers is another high-priority policy area since greater financial access not only promotes growth but promotes inclusive growth by fostering equality of opportunity.

In the broader context of sustaining developing Asia's growth beyond the global crisis, financial development matters, and matters a lot, because investment matters, and matters a lot. However, there is a likely to be a gradual but clear change in developing Asia's growth paradigm from a growth driven primarily by inputs and factor accumulation to a growth based on productivity growth. For example, Park and Park (2010) find some empirical evidence that since around 2002 there has been a relative shift in the source of the region's growth from capital accumulation to TFP growth. What this means is that efficiency of investment will increasingly overshadow the quantity of investment as the primary source of sustainable growth. A sound and efficient financial system is vital for the transition from the region's precrisis, accumulation-led growth paradigm to its postcrisis, productivity-led growth paradigm for the simple reason that the primary function of banks, stock markets and bond markets is to allocate capital to its most productive uses. In addition to a more efficient allocation of resources in the static sense, dynamic efficiency is likely to grow in importance in developing Asia's postcrisis growth process and again, a well-functioning financial system will play a key role. A more innovative and

knowledge-based economy is likely to flourish when would-be entrepreneurs with the best new ideas and new ways of doing things have access to the capital they need to transform their vision into commercial reality. Institutions such as venture capital that are still in their infancy in developing Asia, general expansion of access to financial services, and new financial products and services that reduce transactions costs and further specialization will all be required if Asian finance is to transform itself from a tool for mobilizing savings to a tool for fostering productivity. If Asian finance is to become a vital link between Asia's old growth paradigm of accumulation to Asia's new growth paradigm of efficiency, Asian finance will have to evolve.

Appendix 1: List of Economies and Number of Observations

	Economy	Number of Observations			
		Full Sample in GDP per Capita Growth Regression	GDP per Capita Growth Regression with Stock Market	TFP Growth Regression	TFP Growth Regression with Stock Market Data
1	Albania	3	0	2	0
2	Algeria	1	0	1	0
3	Argentina	4	4	4	4
4	Armenia*	3	2	1	1
5	Australia	4	4	4	4
6	Austria	4	4	4	4
7	Bahrain	4	2	3	1
8	Bangladesh*	3	3	3	3
9	Belgium	2	2	2	2
10	Benin	3	0	3	0
11	Bolivia	4	3	4	3
12	Botswana	4	3	4	3
13	Brazil	3	3	3	3
14	Bulgaria	3	3	3	3
15	Burundi	4	0	4	0
16	Cambodia*	2	0	2	0
17	Cameroon	4	0	4	0
18	Canada	4	4	4	4
19	Central African Republic	1	0	1	0
20	Chile	4	4	4	4
21	China, People's Rep. of*	4	3	4	3
22	Colombia	4	4	4	4
23	Costa Rica	4	3	4	3
24	Cote d'Ivoire	3	3	3	3
25	Croatia	3	3	0	0
26	Czech Republic	3	3	2	2
27	Denmark	4	4	4	4
28	Ecuador	4	3	4	3
29	Egypt, Arab Rep.	4	4	4	4
30	El Salvador	4	2	4	2
31	Estonia	3	2	0	0
32	Fiji Islands*	4	3	4	3
33	Finland	4	4	4	4
34	France	4	4	4	4
35	Gabon	4	0	4	0
36	Gambia, The	2	0	2	0
37	Germany	3	3	3	3
38	Ghana	4	3	4	3
39	Greece	4	4	4	4
40	Guatemala	4	2	4	2
41	Guyana	3	1	3	1
42	Honduras	4	1	4	1
43	Hungary	4	3	4	3
44	India*	4	4	4	4
45	Indonesia*	4	4	4	4
46	Iran, Islamic Rep.	2	2	2	2
47	Ireland	4	3	4	3

Appendix 1. *continued.*

	Economy	Number of Observations			
		Full Sample in GDP per Capita Growth Regression	GDP per Capita Growth Regression with Stock Market	TFP Growth Regression	TFP Growth Regression with Stock Market Data
48	Israel	4	4	4	4
49	Italy	4	4	4	4
50	Jamaica	2	2	2	2
51	Japan	4	4	4	4
52	Jordan	4	4	4	4
53	Kazakhstan*	3	2	0	0
54	Kenya	4	4	4	4
55	Korea, Rep. of*	4	4	4	4
56	Kuwait	1	1	3	3
57	Kyrgyz Republic*	3	2	1	1
58	Lao People's Democratic Republic*	3	0	3	0
59	Latvia	3	3	1	1
60	Lesotho	3	0	3	0
61	Libya	1	0	2	0
62	Lithuania	3	3	1	1
63	Malawi	1	0	1	0
64	Malaysia*	4	4	4	4
65	Mali	4	0	4	0
66	Mauritania	2	0	2	0
67	Mauritius	4	4	4	4
68	Mexico	4	4	4	4
69	Mongolia*	2	2	2	2
70	Morocco	4	4	4	4
71	Mozambique	3	0	3	0
72	Nepal*	1	1	1	1
73	Netherlands	4	4	4	4
74	New Zealand	4	4	4	4
75	Niger	3	0	3	0
76	Norway	3	3	3	3
77	Pakistan*	4	4	4	4
78	Panama	4	3	4	3
79	Papua New Guinea*	4	2	4	2
80	Paraguay	4	3	4	3
81	Peru	3	3	3	3
82	Philippines*	4	4	4	4
83	Poland	3	3	4	3
84	Portugal	4	4	4	4
85	Romania	2	2	2	2
86	Russian Federation	3	3	0	0
87	Rwanda	4	0	4	0
88	Saudi Arabia	4	3	3	2
89	Senegal	4	0	4	0
90	Sierra Leone	1	0	1	0
91	Singapore*	2	2	2	2
92	Slovak Republic	3	3	2	2
93	Slovenia	1	1	0	0
94	South Africa	4	4	4	4

Appendix 1. *continued.*

	Economy	Number of Observations			
		Full Sample in GDP per Capita Growth Regression	**GDP per Capita Growth Regression with Stock Market**	**TFP Growth Regression**	**TFP Growth Regression with Stock Market Data**
95	Spain	4	4	4	4
96	Sri Lanka*	4	4	4	4
97	Sudan	3	0	3	0
98	Swaziland	4	4	4	4
99	Sweden	4	4	4	4
100	Switzerland	4	4	4	4
101	Syrian Arab Republic	3	0	3	0
102	Taipei,China*	4	4	4	4
103	Tanzania	3	2	3	2
104	Thailand*	4	4	4	4
105	Togo	4	0	4	0
106	Trinidad and Tobago	2	2	2	2
107	Tunisia	4	4	4	4
108	Turkey	4	4	4	4
109	Uganda	4	2	4	2
110	United Kingdom	4	4	4	4
111	United States	4	4	4	4
112	Uruguay	4	3	4	3
113	Venezuela, RB	4	4	4	4
114	Viet Nam*	1	1	1	1
115	Yemen, Rep. of	1	0	1	0
116	Zambia	3	2	3	2
	Number of economies	116	92	111	87
	Total observations	385	287	363	268

*ADB developing member country.
GDP = gross domestic product, TFP = total factor productivity.
Note: Due to lack of data on exchange rate regimes, actual observations are reduced in equations 5, 10, and 15 of the regression equations.

Appendix 2: Definition of Variables and Their Data Sources

Variable	Definition	Data Source
Real GDP per capita	GDP per capita, in constant 2000 US dollars	World Bank, World Development Indicators online database
Total factor productivity	Technology derived from the production function, adjusted for labor quality.	Park (2010)
Capital inflows	Sum of total direct investment and portfolio investment in an economy (percent of GDP)	International Monetary Fund, International Financial Statistics online database
Liquid liabilities	Sum of currency and deposits (M0), transferable deposits and electronic currency (M1), time and savings deposits, foreign currency transferable deposits, certificates of deposit, and securities repurchase agreements (M2); plus travelers checks, foreign currency time deposits, commercial paper, and shares of mutual funds or market funds held by residents (percent of GDP)	Beck and Demirgüç-Kunt (2009)
Private credit	Private credit by deposit money banks (percent of GDP)	Beck and Demirgüç-Kunt (2009)
Stock market capitalization	Value of listed shares (percent of GDP)	Beck and Demirgüç-Kunt (2009)
Years of schooling	Years of schooling	Barro and Lee (2010)
Government spending	General government final consumption expenditure (percent of GDP)	World Bank, World Development Indicators online database
Inflation	Annual percent change in consumer price index	World Bank, World Development Indicators online database
Trade openness	Sum of exports and imports of goods and services (percent of GDP)	World Bank, World Development Indicators online database
Governance	Extent of institutionalized constraints on the decision-making powers of chief executives, whether individuals or collectivities	Polity IV (Marshall and Jaggers 2009)

GDP = gross domestic product, TFP = total factor productivity.

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About the Paper

Gemma Estrada, Donghyun Park, and Arief Ramayandi empirically examine the relationship between financial sector development and economic growth. Their evidence suggests that further development of the financial sector will have a positive impact on developing Asia's growth. However, the primary role of financial development in growth is likely to shift away from quantitative mobilization of savings and investment toward improvement of the efficiency and quality of investment.

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Printed in the Philippines