Financial Development and Long-term Economic Growth*

Jon Wongswan
Pipat Luengnaruemitchai
Watcharida Boonthaveepat

September 2013

1 Introduction

Why do countries grow at different rates? This has been an important question in academic fields and has important policy implications. For example, a 1 percent growth rate differential per year may translate into a difference in GDP of about 20 percent over two decades. This is material enough to differentiate between developed and emerging economies. Given the importance of this topic, there is vast research to understand drivers of economic growth.

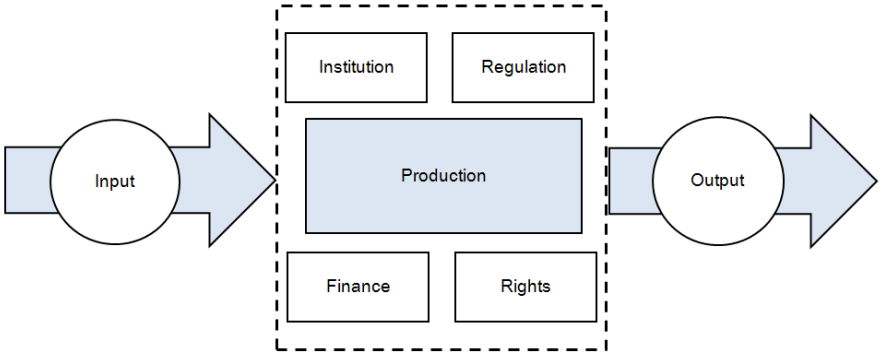
Basic growth theory postulates that human and physical capital are important factors in driving economic growth (part of Input in Figure 1). As the country develops, productivity is another source in driving growth (part of Production in Figure 1). Apart from these main factors, economic growth also depends on other supporting factors such as the structure of institutions (Institution), regulations and their enforcability (Regulation), enforcement of physical and intellectual property rights (Rights) and well-functioning financial markets (Finance). As the growth literature has a bettter understanding of the role of the main factors in contributing to growth, recent studies have focused more on understanding the importance of these supporting factors.

Finance plays an instrumental role in supporting economic growth by gathering and pooling of savings, improving resource allocation, and monitoring and exerting corporate governance. This in turn helps facilitate investment decisions. However, finance also deepens economic integration both within an economy and between countries and amplifies economic shocks. The severity of recent episodes of economic crises can in part be attributed to the development of financial systems.

This paper empirically examines the relationship between financial development and long-term economic growth by using a standard growth panel regression. We focus on the size of the financial sectors as a proxy for financial development due to data availability across countries

*This paper was prepared for the Bank of Thailand Symposium 2013, September 19-20, 2013. The authors are affiliated with Phatra Securities. Views expressed in this paper do not necessarily reflect those of Phatra Securities or those of the Bank of Thailand.

Figure 1: **Economic Production Function**



and time. The main contribution of our paper to the literature is as follows. First, this paper uses a broader sample, in terms of both the time period and number of countries, to examine the relationship. We use data from 1960 through 2011, which covers 150 countries. Second, we examine the non-linear relationship between financial development and economic growth. Lastly, this paper also examines the role of financial development on the volatility of economic growth.

We find that the size of the financial sectors has a statistically and economically positive impact on future economic growth. In addition, we find that this relationship is non-linear. More specifically, we find that the positive contribution to growth *diminishes* as the size of the financial sectors *grows*. In other words, it implies that there can be *too much* finance—-a vanishing effect of financial development on growth. We further explore this effect and find that it predominantly occurs in emerging economies. Lastly, we find that the size of the financial sector has a positive relationship with future volatility of economic growth. Our results should be useful as a guage to think about the cost and benefit of the size of financial markets. More specifically, there is a trade-off between its impact on growth and volatility, regarding which different countries may have different preferences.

The paper is organized as follows. Section 2 discusses theoretical and empirical links between finance and economic growth. The framework for our empirical work and data description are discussed in Section 3. Section 4 reports our empirical results. Section 5 discusses Thailand's financial development. Conclusion and policy implications are discussed in Section 6.

2 Finance and Growth

The relationship between financial development and economic growth has long been discussed in economic literature. In this section, we discuss why finance could support and undermine long-term economic growth. We also briefly review empirical studies on the relationship be-

tween finance and growth.[1]

2.1 Why can finance support growth?

While finance is not a direct input to the economic engines of growth, financial systems play an important role in the economy by alleviating friction and reducing transaction costs in investment transactions. There are costs associated with gathering information, enforcing contracts and making investment transactions. These transaction costs and information asymmetry are the main reason for the existence of financial systems.

Imagine a world with perfect information and no transaction costs. Savers, who have excess capital, and entrepreneurs, who are in need of capital to invest in their business opportunities, have perfect information about one another. The savers know who the entrepreneurs are and can lend directly to them. The savers can assess the riskiness of each entrepreneur and can allocate their investment based on the risk and return of the investments. Without asymmetric information, savers know how the investment is spent and can costlessly monitor the investment. In this world, there is almost no need for a financial intermediary. Investment can take place with minimal costs and capital can be allocated efficiently.

With imperfect information and information asymmetry, financial intermediaries facilitate economic transactions by providing information about possible investments, enforcing contracts, and easing the exchange of goods and services. Importantly, the key functions of finance systems are included:

- **Gathering and pooling of savings**. Mobilization of savings is a costly process. Financial systems reduce transaction costs associated with collecting savings from different individuals and creating trust for savers to feel comfortable in relinquishing control of their savings. In the process, financial systems perform an important role of *liquidity and maturity transformation*—transforming illiquid investment projects into (more) liquid saving products and, in some cases, transforming long-maturity investment projects into shorter-term savings products. Financial intermediaries economize transaction costs through economies of scale and can profoundly affect growth by increasing savings available for capital accumulation.
- **Allocating financial resources and producing information**. There are costs associated with investment opportunities. Financial intermediaries may help reduce the costs of acquiring and processing information on possible investments. Finance also helps improve resource allocation by ensuring that capital is allocated efficiently to those opportunities with the best possible risk-reward tradeoffs. Financial markets also improve this process by encouraging information disclosure, performing due diligence, and enforcing corporate governance.
- **Monitoring and exert corporate governance**. Monitoring and enforcing the use of capital is another costly process for individual savers. The ability of shareholders and creditors

[1] See Levine (2005) for a comprehensive review of theoretical and empirical studies on finance and growth.

to monitor firms effectively can improve the efficiency of the resource allocation and make savers more willing to finance production and innovation. Financial markets can also align magerial incentives with those of the owners.

With these functions, finance can influence savings and investment decisions, and thus affect economic growth. In the absence of these roles, the mobilization of funds and investment can be impeded and adversely affect investment and growth.

In addition, financial systems assist in hedging, diversifying and pooling risks, helping the participants in managing their risks and better planning their investment and production decisions. Insurance services can mitigate a variety of risks that individuals and firms face. In addition, by allocating capital to the right investment projects with the best possible returns and sound corporate governance, finance promotes technological innovations, encourages improvement in production efficiency, and increases productivity, thus further enhancing growth and welfare. Moreover, access to financial services can help reduce poverty. Credit access alleviates liquidity constraints and helps consumers smoothen their consumption and stabilizes welfare in case of shocks.

Banks and financial markets perform these roles differently and there are differences in bank-based and market-based economies in terms of how financial resources are pooled, allocated, and monitored. Allen and Gale (2000) summarize the functions of financial intermediaries and compare the role of banks and markets in performing these functions.

2.2 Why could finance undermine growth?

While promoting growth, finance also plays a key role in building up imbalances, triggering, and exacerbating the downfall of past economic and financial crises, for example, the US S&L crisis in the early 1980s, the Japanese bubble burst in the 1980s, the Mexican crisis in the 1990s, the Asian crisis in the late 1990s, the dot-com bust in the early 2000s, and the subprime crisis in the late 2000s. These crises created significant output losses. In most, if not all, of these episodes, the use of leverage, financial innovations, and rapid credit growth amplified the asset price booms and busts. The balance sheet crisis and deleveraging process following the bursting of these bubbles left the economy in recession for some time.

Finance can make an economy susceptible to shocks and fragility through the same mechanism that promotes growth. For example, finance can:

- **Amplify shocks and lead to financial crises**. The *liquidity and maturity transformation* from short-term, liquid savings into long-term, illiquid invesments can make the economic system susceptible to shocks.[2] The costs of financial crises (bank failures, in particular) can be substantial, both in terms of output losses and fiscal costs. The use of leverage and financial integration can further amplify the magnitude of the shocks.

[2]See, for example, Diamond and Dybvig (1983) for the mechanism of how illiquid assets and liquid liabilities could give rise to self-fulfilling panics and can cause an output loss.

- **Create bubble and misallocation of resources**. While finance encourages efficient allocation of resources, finance can lead the economy into an irrational bubble, in which asset prices rise beyond their intrinsic values solely because of anticipated higher future prices. In that situation, resources could be misallocated to "bubble" sectors (recall the housing bubble) or consumers can stretch their balance sheets beyond their means. These could entail large adjustment costs after the bubble bursts.

2.3 Empirical studies

A substantial body of literature has attempted to find empirical evidence of the relationship between finance and economic growth.[3] Most studies use cross-country or panel datasets to assess the relationship. The studies dated back to Goldsmith (1969), which was one of the first studies to show the presence of a positive correlation between the size of financial development and long-term economic growth. However, Goldsmith (1969) did not control for other factors influencing growth and made no attempt to establish whether there was a causal link going from financial depth to growth or the other way around. Several economists have argued that a large financial system was simply a result of economic growth, or as Joan Robinson famously put it in 1952, *where enterprise leads, finance follows.*

Another wave of studies on finance and growth started in the 1990s. King and Levine (1993) finds that the initial level of financial depth is a good predictor of subsequent rates of economic growth, capital accumulation and economic efficiency improvement. Levine and Zervos (1998) find that stock market liquidity (but not the size of the stock markets) and banking development are also positively and significantly correlated with future economic growth, capital accumulation and productivity growth. Later studies focus on the causal relationship between finance and growth. For example, Beck et al. (2000), Levine et al. (2000), and Beck and Levine (2004) use instrumental variables and dynamic panel techniques to identify a causal relationship going from finance to growth.

A different approach to study the effect of finance on growth is to focus on firm- or industry-level data. For example, Rajan and Zingales (1998), using industry-level data, find a positive causal link going from financial development to growth. They find that industrial sectors that are more dependent on external finance grow relatively more in countries with a larger financial sector.

While it is generally accepted that finance is a driving factor for growth (and not simply a by-product of economic development), several studies question the robustness of the finance-growth nexus. Several papers show that financial development leads to higher growth volatility and crises. Rajan (2005), for example, warns that the presence of a large and complicated financial system had increased the probability of a meltdown. Easterly et al. (2000) find that there is a threshold, beyond which financial depth starts to increase growth volatility. Relatedly, the empirical banking and currency crisis literature often finds that monetary aggregates, such as

[3] See Levine (2005) and Papaioannou (2007) for comprehensive reviews of the empirical studies

domestic credit, are among the best predictors of crises (see, for example, Kaminsky and Reinhart (1999)). Since banking crises usually lead to recessions and output losses, an expansion of domestic credit could be associated with slower subsequent growth.

More recent literature has pointed to non-linearities in the relationship between finance and growth–the nexus may weaken over time as financial sectors deepen.[4] Rousseau and Wachtel (2011) find that the impact of financial deepening on growth is not as strong with more recent data as it appeared in the earlier panel studies. They find that excessive financial deepening or too- rapid credit growth may led to financial crises. Once crisis episodes are removed, the finance-growth relationship remains intact. Therefore, financial deepening has a strong impact on growth as long as a country can avoid a financial crisis. In crisis episodes (which are more often than not due to excessive deepening), the benefits of financial deepening disappear.

Further, Cecchetti and Kharroubi (2012), using a sample of emerging and developed markets, find that the level of financial development is good only up to a point, after which it becomes a drag on growth. They argue that because the financial sector competes for scarce resources (importantly, labor), financial booms may not be growth-enhancing and more finance may not be always better. Arcand et al. (2012) argue that there can be *too much* finance. In particular, they find that when credit to the private sector exceeds 100 percent of GDP, finance starts having a negative effect on output growth. They attribute economic volatility, increased probability of economic crises, and potential misallocation of resources as the possible reasons for their finding.

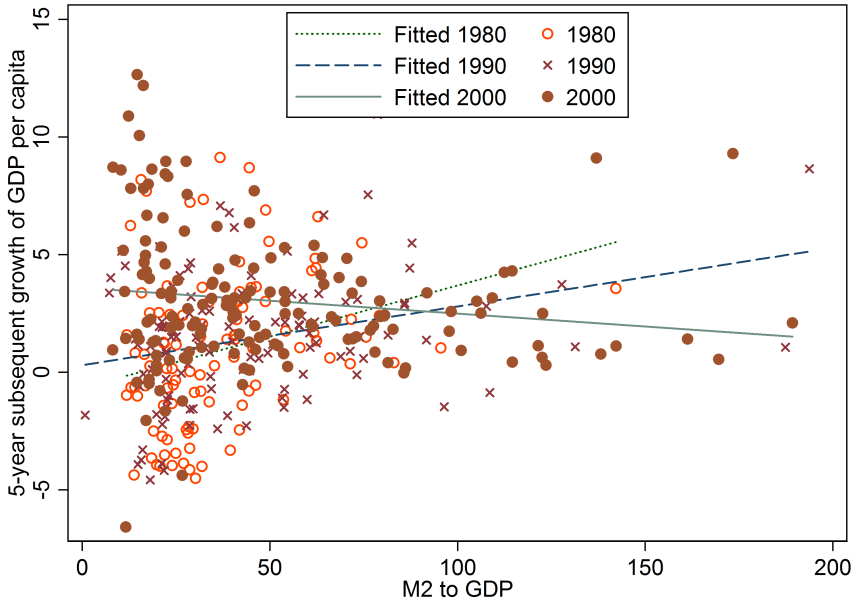
The relationship between financial depth and growth may depend on whether lending was used to finance investments in productive assets. Beck et al. (2009) find that credit to enterprise and credit to household have different effect on growth and income inequality. Enterprise credit raises economic growth and reduces income inequality whereas household credit has no effect. Household credit is negatively associated with excess consumption sensitivity, while there is no relationship between enterprise credit and excess consumption sensitivity. It is possible that it is the rapid expansion of household credit that leads to the negative effects of financial development.

Beck et al. (2012) find that a large financial sector might stimulate growth in the short term, but this comes at a cost of higher growth volatility, particularly, in the high income countries. Similarly, Loayza and Ranciere (2005) find that a positive long-run relationship between financial intermediation and output growth can coexist with a negative short-run effect from financial fragility.

Using the data in our sample, we also find the *vanishing effects* of finance over time. As shown in Figure 2, a simple cross-country scatter plot of financial deepening and economic growth reveals that the relationship diminishes and turns negative over time.

[4] See Beck (2012) for a more recent review of the literature.

Figure 2: **Vanishing effects of finance?**



Source: World Development Indicators, Authors' calculation

3 Empirical Framework

To assess the impact of financial development on long-term economic growth and growth volatility, we use the panel growth regression in order to capture the differences both in time and cross-country dimensions. We use the 5-year average of subsequent real GDP per capita as the dependent variable.

Following the literature, we control for the basic growth determinants, which have been found to be important in the economic growth literature (see, for example, Barro (1998)). These include the initial levels of GDP per capita in logs (to control for growth convergence[5]), levels of education attainment (a measure of human capital), trade-to-GDP ratio (a proxy for economic openness), government consumption-to-GDP (a proxy for the role of government) and inflation. These control variables are also common in the finance and growth literature. We then ask how the level of financial development affects *subsequent* growth of real per-capita GDP growth after the standard determinants are being controlled.

Specifically, we estimate the following equation, using panel regression with country fixed ef-

[5]Growth convergence is a concept in which the growth rate of each country tends to decline as its level of income grows approaching its own steady state (conditional convergence). Poor countries also tend to grow faster than (and tend to *catch up* with) the rich ones (absolute convergence). Therefore, one would expect to observe a negative relationship between the growth rate and the level of income both over time and cross-sectionally

fects to capture country-specific, time-invariant differences.

$$(y_{i,t+5} - y_{i,t})/5 = AX_{i,t} + \beta_1 \mathrm{FD}_{i,t} + \alpha_i + \varepsilon_{i,t} \tag{1}$$

where $y_{i,t}$ is the log of real per capita GDP, $X_{i,t}$ is a matrix of basic growth determinants for the country i at time t. $\mathrm{FD}_{i,t}$ is the measure of financial development. If the level of financial development is positive to subsequent economic growth, we would expect a positive value of β_1 coefficient. α_i is the country-specific intercept term.

In measuring the financial development, we focus on financial depth by using the size of financial system and capital markets. For the size of financial system, we use the total credit to private sector to GDP and M2 to GDP ratios as the proxy of financial development.[6] For the size of capital markets, we use the stock market capitalization-to-GDP ratio.

3.1 Non-linearity

We then ask how the *incremental* benefits of financial development on growth varies as financial systems deepen. First, we allow for the impact of financial market development on economic growth to be different at the high level of financial market development (for example, greater than the 80th percentile).

$$(y_{i,t+5} - y_{i,t})/5 = AX_{i,t} + \beta_1 \mathrm{FD}_{i,t} + \beta_2 \cdot I(p(\mathrm{FD}_{i,t}) > 80)) \times \mathrm{FD}_{i,t} + \alpha_i + \varepsilon_{i,t} \tag{2}$$

where $p(\cdot)$ is a percentile operator.

Another way to allow for non-linearity is to impose a quadratic specification on the financial development term:

$$(y_{i,t+5} - y_{i,t})/5 = AX_{i,t} + \beta_1 \mathrm{FD}_{i,t} + \beta_2 \mathrm{FD}_{i,t}^2 + \alpha_i + \varepsilon_{i,t} \tag{3}$$

With the specification, the relationship between economic growth and financial development takes the form: $\frac{\partial \Delta y_t}{\partial \mathrm{FD}} = \beta_1 + 2\beta_2 \mathrm{FD}_t$. If the benefit of finance on growth is increasing in the level of financial development, β_2 would be positive. On the contrary, a negative value of β_2 would imply that the incremental benefit of financial development diminishes as the financial sector becomes more developed.

3.2 Growth volatility

To assess how the levels of financial development affect long-term growth volatility, we use subsequent 10-year standard deviation of per capita GDP growth as the dependent variable and use the standard determinants as the control variables. We then add the levels of financial development to see how finance explains the growth volatility.

$$\sigma_{t,t+10}(\Delta y_i) = AX_{i,t} + \gamma \mathrm{FD}_{i,t} + \alpha_i + \varepsilon_{i,t} \tag{4}$$

[6] M3 or liquid financial liabilities (M3-M1) are also used as measures of financial depth in the literature. We focus on M2-to-GDP ratio because it is more readily available across a larger set of countries. We have tried using M3-to-GDP ratio as a robustness check and the results remain largely unchanged.

3.3 Estimation issues

While this approach is rather standard in finance and growth literature, it is subject to several drawbacks, as mentioned before in the literature. First, it is almost impossible to account for all possible factors that may affect growth. The estimation may be subject to the omitted-variable bias. Second, there is potentially a reverse causation. We use the 5-year subsequent growth rates as our dependent variable and initial values as the independent variable, so the simultaneity bias and causality bias should be less of an issue. However, there is still non-negligible endogeneity concerns. Financial development may increase in anticipation of future productivity growth. Third, the measures of financial development—M2-to-GDP and stock market capitalization-to-GDP ratios—are rather coarse and not theoretically driven. It is unclear how the measurement errors would affect estimates.

In addition, we correct for the autocorrelation of the error terms. We use 5-year ahead average per capita GDP growth as the dependent variable and use overlapping sample to maximize the sample. While this could give rise to the autocorrelation problem, the error term can be correlated over time. Although the estimates are unbiased, the estimated standard errors can be inconsistent. As a robustness test, we estimate autocorrelation consistent covariance matrix using Newey and West (1987) estimator with 5-year lag.

3.4 Data

We analyze the relationship between financial development and economic growth in an unbalanced panel of 150 countries from 1960-2011. Data availability varies across the countries and the variables we include. For our baseline specifications, data availability ranges from 4 to 46 observations for each country. We categorize our country sample into Developed Markets (DM), Emerging Markets (EM) and the others based on whether the countries are included in respective MSCI equity indices.

We utilize a number of newly updated cross-country datasets to create a large panel. For real GDP per capita, we use the real GDP at constant prices and population series from *Penn World Table*,[7] which is the most widely used source of data for cross-country comparisons for the level and growth rate of GDP. For most control variables, *World Development Indicators*[8] provides an excellent source of economic data on various dimensions across a large set of countries. We also complement the macro data by the IMF's *World Economic Outlook database*.[9] The *Global Financial Development Database*[10] at the World Bank provides an extensive dataset of financial system characteristics for a wide range of countries. We also use data on various stock exchanges from the *World Federation of Exchanges*.[11] The governance indicators are taken from the World

[7] Penn World Table Version 8 is available for download at `http://www.ggdc.net/pwt`

[8] `http://data.worldbank.org/data-catalog/world-development-indicators`

[9] `http://www.imf.org/external/ns/cs.aspx?id=28`

[10] `http://data.worldbank.org/data-catalog/global-financial-development`

[11] `http://www.world-exchanges.org/`

Bank's *Worldwide Governance Indicators* (WGI)[12] and the *Quality of Government Institute*.[13] The market data, such as stock index returns and foreign exchange volatility, are extracted from *Bloomberg*.

A summary of the data sources and variables used is included in the Appendix.

4 Empirical Results

4.1 Role of Finance in Driving Economic Growth

We evaluate the impact of financial development on economic growth by estimating panel growth regressions. Table 1 shows results for the basic growth regressions. As we have extended our sample to cover a larger sample period (1960-2011) and more countries (150 countries) than in previous studies, we first estimate the basic growth regression with five control variables. The result is in the column (1) and is consistent with the other studies, except that the size of government spending to GDP (Size of Govt) is statistically insignificant. We find that a proxy for human capital (Education) is positively related to future economic growth which is consistent with the basic growth theory that identifies human capital as one important factor of production. In addition, we find that a country with a higher level of real economic integration with the rest of the world (Openness) has higher future economic growth. A country that trades with the rest of the world can gain benefits from international trade both in terms of production specialization and diversification of sources of income. Conversely, we find that the initial level of GDP (log GDP per capita) is negatively related to future economic growth—consistent with the convergence of growth hypothesis. We also find that the level of inflation has a negative impact on economic growth as higher inflation can lead to instability and misallocation of resources.

We use two proxies for the size of financial sector: the broad money (M2) in percentage of GDP and stock market capitalization in percentage of GDP. The results are shown in columns (2) and (3), respectively. We find a statistically significant positive impact of the role of finance in explaining future economic growth. In terms of the economic significance, a one-standard-deviation increase in M2 to GDP (Stock Market Capitalization to GDP) leads to a 0.4 (0.2) percent increase in the annual growth rate of real GDP per capita, which translates into a difference in growth rate of about 9 (4) percent over a 20-year period. This growth rate differential is material for the level of real GDP per capita. Overall, we find a statistically and economically significant impact of the size of financial markets on future economic growth.

4.2 Is there a vanishing effect?

Recent studies have discussed the vanishing effect of financial development on economic growth in which the contribution of financial development in driving economic growth diminishes as the

[12] `http://www.govindicators.org`
[13] `http://www.qog.pol.gu.se/`

level of financial development increases. In this section, we examine this issue by modeling the non-linearity relationship in two ways. First, we estimate a panel growth regression by allowing for the impact of financial development on economic growth to be different at a high level of financial development. Second, we model the non-linearity by adding a quadratic term into the panel growth regression Equation 3. This specification allows for the diminishing effect to come into play at different levels at different rates—more flexibility than the first specification.

Table 2 shows results for the vanishing effect of the size of financial development on future economic growth. Columns (1) and (2) show results for the non-linearity by using the dummy variable to allow for the difference in the impact to growth. We find a statistical significance of the vanishing effect of the size of equity market—coefficient on MktCap $\times I(\text{above})$ is statistically negative. This implies that as the size of the stock market increases, the contribution of the stock market to future economic growth decreases. However, we do not find evidence for the vanishing effect when we measure the size of financial development by M2 to GDP. Columns (3) and (4) show results for the non-linearity via the quadratic equation. We find statistically significant vanishing effects in both M2 to GDP and stock market capitalization to GDP.

From the regressions, we can back out the level of M2 to GDP and stock market capitalization to GDP that can lead the size of financial markets to have a negative impact on future economic growth. These thresholds for M2 to GDP and stock market capitalization to GDP are 200 percent and 250 percent, respectively. It is important to note that the results represent the average relationship for all countries across time and are not to be interpreted strictly as a critical threshold for any country, but are instead intended to be a guideline. However, when we include both measures of size of financial sectors jointly, only the size of stock sectors is statistically significant. It is important to note that both measure of size of financial sectors has significant correlation (0.6), therefore, we are not interpreting this as evidence that the size of the stock market is more important than that of M2/GDP.

Figure 3 shows the estimated growth rate of real GDP per capita at a different level of size of stock market to GDP [14]. To illustrate the vanishing effect, we show the red-dotted line that represents the constant (no vanishing effect) impact of size of stock market capitalization to GDP. It is evident that the estimated impact (blue line) from the increase in the size of the stock market increases at a decreasing rate—below the red-dotted line.

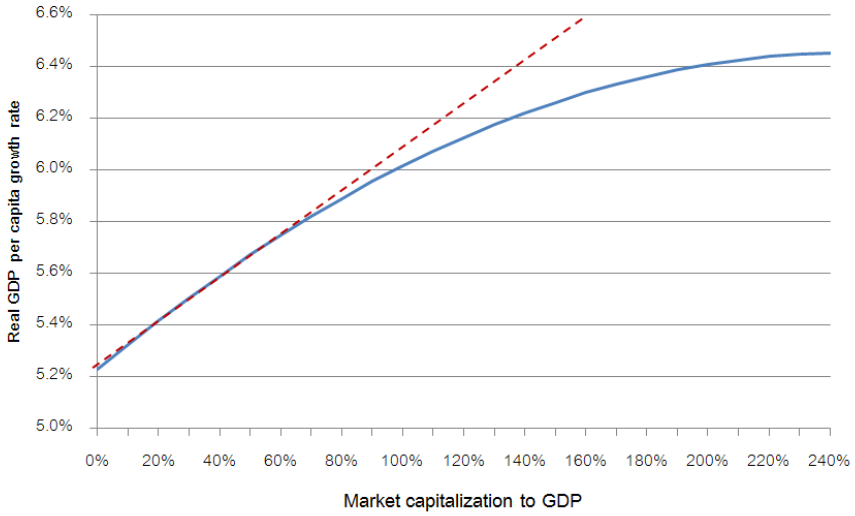
An interesting question is why we observe the diminishing marginal benefit of the size of financial development on economic growth. We explore some possible hypotheses. First, we examine whether or not this phenomenon occurs across all the countries. It is possible that this effect may be more prominent in countries with less developed financial and regulatory structures to support the increase in financial markets. We proxy for these characteristics by dividing the countries into two groups: developed and emerging markets [15].

We re-estimate panel growth regressions and divide the sample into developed and emerging markets and the results are shown in Table 5. Because not all countries in our sample are either

[14] Conditioned other variables at the sample average values

[15] We use MSCI classification of equity indices to group the countries

Figure 3: **Vanishing effects of finance?**



Source: Authors' calculation

in developed or emerging markets, we re-estimate the regression for countries that are classified as either developed or emerging markets to use for benchmark comparison of results and they are shown in columns (1) through (3). Columns (4) to (6) show results for developed markets and columns (7) through (9) show results for emerging markets. For M2 to GDP, we find evidence of vanishing effects in both sets of countries. However, for stock market capitalization to GDP we only find evidence of vanishing effect in emerging markets and the effect is stronger.

Second, the larger size of the financial sector relative to GDP may represent a rapid increase in the financial sector as compared to the real sector. This may lead to a financial market price bubble. Therefore, when the bubble is corrected it will have an impact on the real economy via the wealth effect. We proxy for this possible effect by dividing the country-time period into the normal and bubble period in which we define the bubble period to be a period in which the *changes* in stock market capitalization-to-GDP and M2-to-GDP ratios are greater than 10 percentage points. Table 3 shows estimation results. We find no statistical evidence for the role of price bubble in explaining the vanishing effect.

Lastly, it is possible that the increase in the relative size in the financial sector may pull resources from other important sectors which in the long run may have a negative effect on growth. We do not test this hypothesis and leave this for future research.

4.3 Does financial development lead to higher growth volatility?

To evaluate the role of financial development on economic growth in another aspect, in this section we focus on its impact on the growth volatility. This issue has been given little attention in the literature but we think that it is important. For example, in a case where two countries have the same average growth rate but one has a higher growth volatility, we believe the welfare of the country with lower growth volatility should be higher.

We define growth volatility as standard deviation of the growth rate of annual real GDP per capita over the subsequent 10-year period. Table 4 shows results for growth volatility from equation (4). Column (1) shows the result from using only the five control variables, similar to those used in the basic growth regression. We find that the initial level of GDP (log(GDP per capita)) has a statistically positive impact on future volatility of GDP growth and the level of education has a statistically negative impact on future growth volatility. Columns (2) and (3) show results of the impact of the size of financial markets on future growth volatility. We find statistical positive relationship for size of the stock market to GDP and future growth volatility but no statistical relationship with M2 to GDP. It is possible that there may be a level effect in the growth volatility—meaning that a country with an average higher level of growth rate may have higher level of growth volatility. To control for this, we add a lagged GDP growth rate into the regression. The results are qualitatively similar. Overall, we find statistically significant evidence for the size of financial markets to future volatility of GDP growth.

Why should we expect this relationship? One possible explanation could be that the complexity of the financial market, which we proxy with its size, may amplify the shocks in the economy. As we do not have the data to test this hypothesis directly at the country level, we attempt to illustrate this idea by examining the volatility of world GDP growth and the relative size of financial markets to GDP. Figure 4 shows the size of global financial assets over time and Figure 5 shows the notional values of derivatives contracts as a percentage of world GDP. The world GDP growth volatility is shown in Figure 6. It is evident that the volatility of world GDP growth has increased in the most recent period, which coincides with the increases in financial assets and exposures. It is important to note that the result cannot be interpreted as causality as there may be some other factors that drive this pattern.

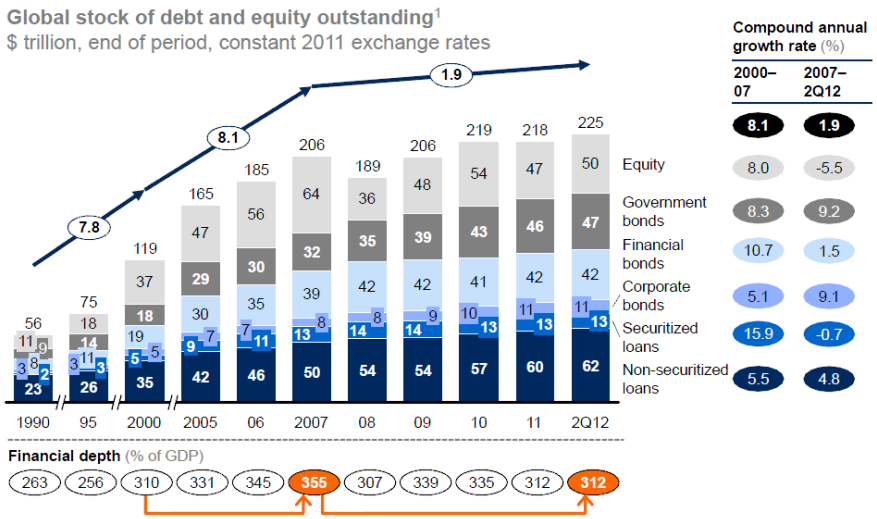
4.4 Robustness

As it is often found in the growth literature that the empirical results can be sensitive, in this subsection we examine the robustness of our empirical results.

First, we check for the sensitivity of the calculation of rolling 5-year GDP growth rate. We re-estimate the regressions using non-overlapping 5-year GDP growth and the results are in Table 6. We find qualitatively similar results but with weaker effects from financial development.

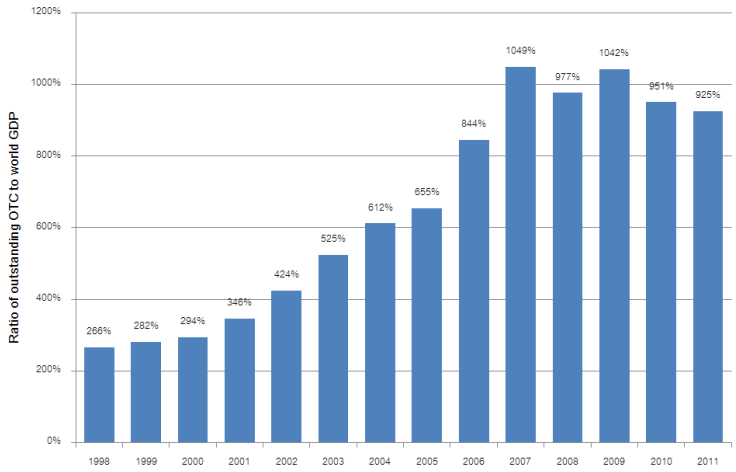
Second, we address the possible estimation issue from using rolling overlapping estimation window. The error term from the regression is likely going to be serially correlated. To account for

Figure 4: **Global Financial Assets**



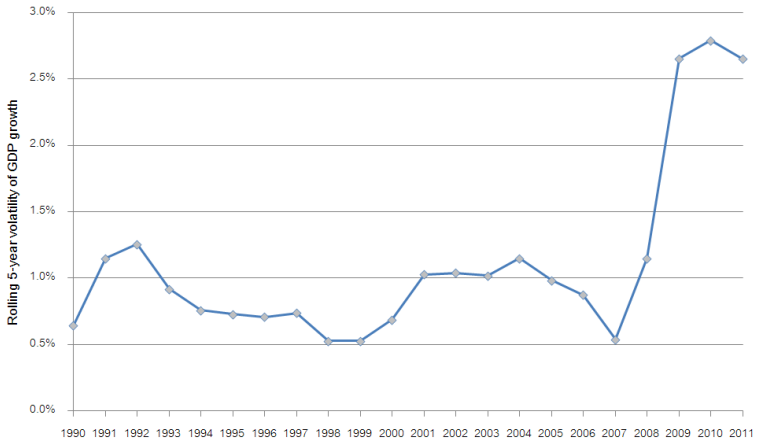
Source: McKinsey Global Institute (2013)

Figure 5: **Notional values of derivatives contracts in percent of Global GDP**



Source: BIS, the World Bank, Authors' calculation

Figure 6: **10-year Global GDP Growth Volatility**



Source: The World Bank, Authors' calculation

this, we calculate Newey-West standard errors using a bandwidth of 5 lags to incorporate the overlapping 5-year period. The results are qualitatively similar as shown in Table 7. Overall, our results are qualitatively robust to the calculation of growth rates and statistical correction for error term autocorrelation.

5 Thailand's Financial Development

This section discusses the financial development in Thailand. As mentioned earlier, there are multiple dimensions of financial development, including *size, depth, breadth, efficiency, stability and access*. Judging from the size of financial systems, Thai financial systems are fairly developed. Figures 7a and 7b compare financial depth as measured by M2-to-GDP and stock market capitalization-to-GDP ratios to the level of income per capita in 2011. The size of the financial systems tend to be larger as a country's income grows. By these measures, Thailand's financial systems are comparable to its richer peers and they are larger than most countries with the same levels of income.

By value added, Thailand's financial intermediation is not large, accounting for 4.8% of GDP, comparing to 35.4% for the manufacturing sector, 11.8% for the agricultural sector, and 13.4% for the trading and repair sectors. This compares to the GDP contribution of the financial sector of about 12% in Singapore, 9% in Malaysia, 8% in the US, and 7% in Korea.[16] The share of labor employed in the financial sector is only around 1.1% in Thailand.[17] With the 4.8% GDP contribution, the productivity of the financial sector, as measured by output per labor, is

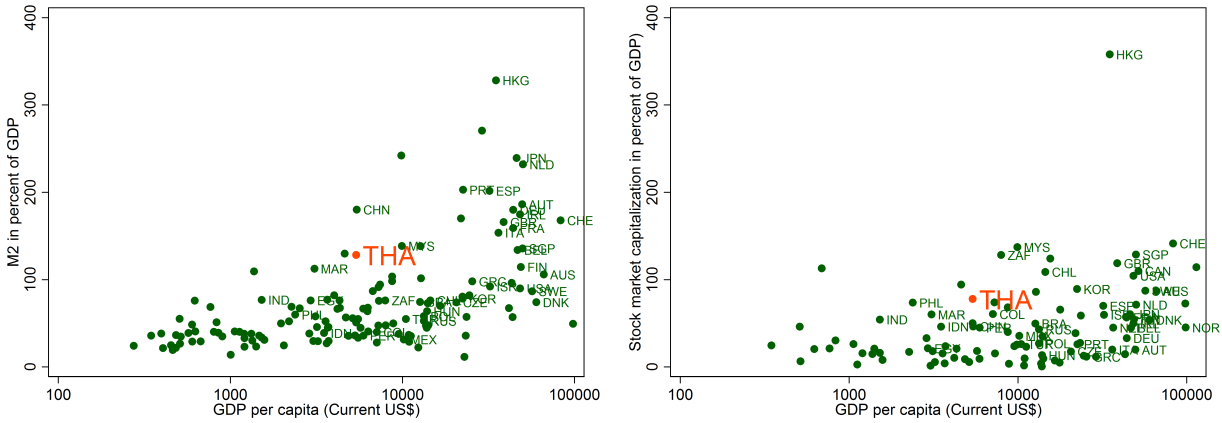
[16]Sources: NESDB and CEIC

[17]National Statistical Office's Labor Force Survey 2013.

Figure 7: **Financial depth compared to GDP per capita**

(a) M2 in percent of GDP

(b) Market capitalization in percent of GDP



Source: World Development Indicators

significantly higher than the rest of the economy. This also reflects in higher wages paid to workers in the financial sector. One could argue that the financial sector could attract productive human resources away from other productive sectors and could affect aggregate productivity over time.

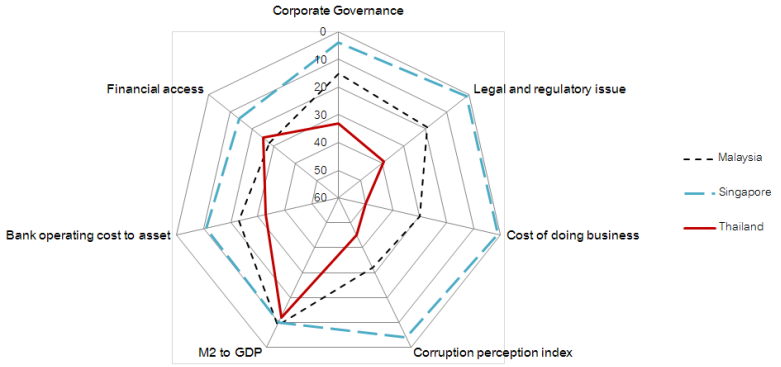
We have so far focused on the size of the financial systems; however, size may not be everything. Despite the decent size of financial systems, Thailand lags behind in other dimensions of financial development. Figure 8 shows the ranking of Thailand's selected indicators related to financial development, compared to 61 other countries as reported in the World Economic Forum's *Financial Development Report 2012*.[18] Data points away from the center of the diagram represent *better* rankings and data points closer to the center represent *worse* rankings. We find that the rank correlation of these dimensions against the size of financial systems is rather high, in the range of 60-75%.

While Thailand is outstanding in terms of size, ranked 12th by M2 to GDP and 20th by private credit to GDP, Thailand fares relatively worse in other dimensions. It is ranked 33rd for banking efficiency (overhead costs to assets) and for corporate governance. Thailand is ranked about 40th or worse for legal and regulatory issues, cost of doing business, and corruption.

For comparison, we look at the rankings of Singapore and Malaysia. It is not surprising that Singapore, the dashed blue line, is ranked better than Thailand in all dimensions given the levels of financial development. However, the development is notably well- balanced. Singapore is ranked well in all dimensions we selected. Malaysia, shown by the dotted black line, is an-

[18] See World Economic Forum (2012).

Figure 8: Size is not everything



Thailand's rankings of selected indicators, compared to 61 other countries, as reported in *Financial Development Report 2012*. **Source:** World Economic Forum (2012) and Authors' calculation.

other example of a country with more balanced financial development: although the size of its financial system is comparable to Thailand, Malaysia is ranked better in almost all other dimensions.

These dimensions of financial development are important for the functioning of financial systems and economic stability. For example, the legal and regulatory issue measures the quality of rule of law and enforcement of contracts, which is one of key weaknesses of Thailand's financial systems. Effective contract enforcement could smoothen the boom and bust cycles. After the Asian crisis, the process of asset foreclosure in Thailand is notoriously long. Fifteen years later, several unfinished high-rises remain on Bangkok's skyline as court proceedings drag on. It can be argued that had contracts been better enforced and creditors' rights better protected, the capital could have been be better utilized and the economic and financial recovery after the crisis could have been faster. On the other hand, if debtors were aware of effective contract enforcement, the risk-taking behavior could have been more limited.

Another notable aspect of Thai financial development is the poor ranking in the efficiency dimension, especially on the banking sector. While Thailand is ranked well in terms of size and profitability (ranked 20th), the efficiency did not fare as well (33rd in terms of bank operating costs to assets and 34th in terms of bank overhead costs). This begs the question of whether the intermediary costs are too high because of this inefficiency. It can be argued that protection and barriers to entry could discourage competition and provide little incentive for efficiency improvement.

Thailand also needs to improve other aspects of financial development. For example, we are still relatively behind on corporate governance, which is important for the functioning of financial systems.[19] Financial access in Thailand, while relatively decent, can be improved to ensure

[19] Ananchotikul and Eichengreen (2009) discuss the issues of corporate governance reforms in emerging markets

that the benefits of financial services—savings, credit, payments and transfers—can be accessed by those who are in need.[20] Corruption and costs of doing business (including regulatory and bureaucratic hurdles) can be improved much further to improve the transparency and efficiency of investment.

6 Concluding Remarks and Policy Implications

In this paper, we examine the relationship between financial development and long-term economic growth. Using a panel growth regression with a large set of countries and long history, we find three interesting observations: (1) financial development supports long-term economic growth; (2) the incremental benefits of finance on growth diminishes as the financial systems deepen; and (3) larger financial systems (particularly the stock market capitalization) contribute to higher future growth volatility. These results suggest that while finance is good for long-term growth, there is a limit to the growth-enhancing properties of finance. The incremental benefits of financial deepening can diminish as financial systems grow. At the same time, financial deepening in part has contributed to higher volatility of growth, especially in the recent financial crises. We also briefly discuss the financial development in Thailand, comparing various aspects of financial developments against its peers. We find that while Thailand is ranked well in terms of the size of financial systems, it trails other countries in the other aspects.

There are several policy implications from our study. First, financial development is not all about size. Although size of financial systems is correlated with other dimensions, the size alone may not tell the whole story of financial development. There is a need to strengthen other aspects of financial development to ensure that the best possible benefits of financial development can be realized. In particular, there should be more policy initiatives to encourage competition and liberalization in the financial sector to lower transaction costs and improve efficiency of financial systems. Breadth of financial products should also be encouraged to diversify risks. In addition, financial access can be improved to ensure that the benefits of finance can be shared to those who need them.

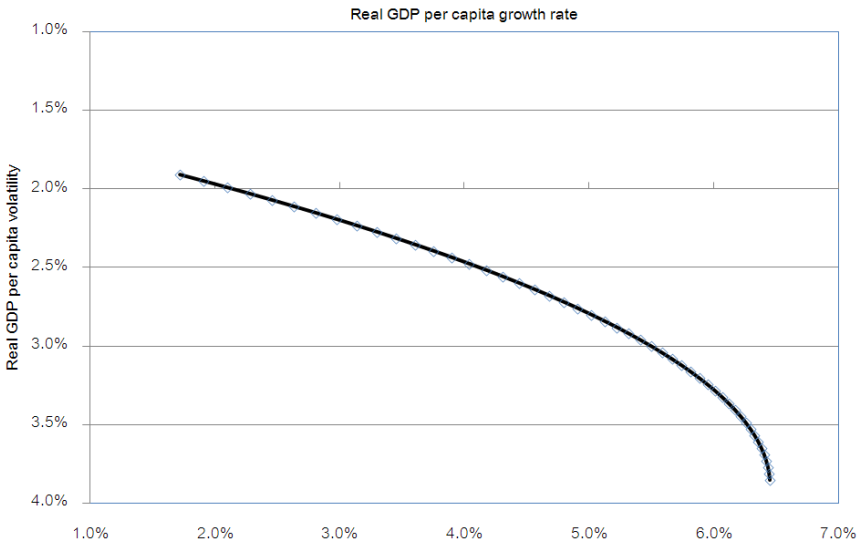
Second, in order to get the most from financial development, it is important to safeguard the economy against the possible negative impacts from financial deepening.

- **Understand risk**. Consumers, firms, banks, market participants as well as regulators need to understand their positions and be able to identify the risks they are taking.
- **Effective regulation and disclosure**. Regulators need to use smart and effective regulation in order to effectively manage risks. Further information disclosure is needed to improve transparency and enforce corporate governance.

and the effects on financial market depth and liquidity. By their measure, Thailand has fallen behind its peers in recent years.

[20]The IMF has a comprehensive global survey on access to financial services worldwide, available at `http://fas.imf.org`.

Figure 9: **Growth and Volatility Tradeoff**



Source: Authors' calculation

- **Prudential macro policies**. The macro policy management should be vigilant and prudent to identify the systemic risks and be able to respond effectively to the shocks

Finally, policy makers may want to weigh the cost and benefit of financial development on economic growth and volatility. Different countries may have different preferences for this trade-off. Figure 9 shows the estimated trade-off from our panel growth regression model. It is important to note that higher economic stability (lower economic growth volatility) comes with a cost of giving up economic growth which may not *necessary always* be the best choice for all countries.

Table 1: Baseline regression
Dependent variable: Five-year average of subsequent real GDP per capita growth

	(1)	(2)	(3)	(4)
log(GDP per capita)	-3.453***	-3.665***	-5.096***	-3.479***
	(-20.73)	(-19.50)	(-16.12)	(-19.57)
log(Education)	0.744***	0.593***	3.253***	0.680***
	(4.567)	(3.472)	(7.367)	(4.084)
Size of Govt	0.186	-0.0250	-0.0863	-0.0114
	(0.905)	(-0.113)	(-0.207)	(-0.0527)
Inflation	-0.0906***	-0.0902***	-0.0372*	-0.0936***
	(-4.405)	(-4.330)	(-1.848)	(-4.544)
Openness	1.674***	1.639***	2.045***	1.628***
	(8.756)	(8.242)	(5.691)	(8.135)
M2 to GDP		0.00949***		
		(3.140)		
Market Cap to GDP			0.00334*	
			(1.945)	
Polity				0.0177***
				(4.784)
Constant	21.45***	23.84***	26.65***	22.38***
	(15.42)	(14.66)	(9.164)	(15.33)
Observations	3,166	2,923	1,237	2,872
R-squared	0.137	0.138	0.198	0.138
Number of countries	150	150	102	135
Adjusted R2	0.0930	0.0902	0.122	0.0936

Estimation: Panel regression with country-specific fixed effects

t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 2: Vanishing effects?
Dependent variable: Five-year average of subsequent real GDP per capita growth

	(1)	(2)	(3)	(4)	(5)
log(GDP per capita)	-3.675***	-5.306***	-4.937***	-3.672***	-5.154***
	(-19.56)	(-16.00)	(-14.03)	(-19.54)	(-16.23)
log(Education)	0.529***	3.166***	3.406***	0.614***	3.170***
	(3.059)	(7.149)	(7.190)	(3.578)	(7.143)
Size of Govt	-0.0450	-0.0434	0.0878	0.000655	-0.139
	(-0.203)	(-0.104)	(0.202)	(0.00294)	(-0.333)
Inflation	-0.0903***	-0.0362*	-0.0310	-0.0901***	-0.0355*
	(-4.338)	(-1.800)	(-1.528)	(-4.327)	(-1.767)
Openness	1.610***	1.960***	2.341***	1.670***	2.027***
	(8.085)	(5.425)	(6.132)	(8.342)	(5.643)
M2 to GDP	0.0191***		-0.0265***	0.00412	
	(3.669)		(-4.260)	(0.818)	
(M2 to GDP)^2	-4.68e-05**		2.49e-05		
	(-2.264)		(1.396)		
Market Cap to GDP		0.00986***	0.0137***		0.00889**
		(2.750)	(3.290)		(2.440)
(Market Cap to GDP)^2		-1.98e-05**	-3.23e-05**		
		(-2.071)	(-2.530)		
M2 $\times$ I(above)				0.00413	
				(1.335)	
MktCap $\times$ I(above)					-0.00495*
					(-1.727)
Constant	24.08***	29.01***	23.87***	23.80***	27.64***
	(14.79)	(9.300)	(6.937)	(14.64)	(9.333)
Observations	2,923	1,237	1,153	2,923	1,237
R-squared	0.140	0.201	0.223	0.139	0.200
Number of countryno	150	102	102	150	102
Adjusted R2	0.0915	0.124	0.141	0.0904	0.123

t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3: Because of bubble?
Dependent variable: Five-year average of subsequent real GDP per capita growth

	Full Sample	EM	DM	Full Sample	EM	DM
	(1)	(2)	(3)	(4)	(5)	(6)
log(GDP per capita)	-0.0368***	-0.0295***	-0.0432***	-0.0514***	-0.0498***	-0.0802***
	(-19.56)	(-7.054)	(-10.92)	(-16.10)	(-7.216)	(-17.69)
log(Education)	0.00581***	0.00581	0.0563***	0.0323***	0.0116	0.0297***
	(3.399)	(1.149)	(9.265)	(7.318)	(1.210)	(5.112)
Size of Govt	-0.000271	0.00989**	-0.0191***	-0.000800	-0.00340	0.0192**
	(-0.122)	(1.995)	(-3.323)	(-0.192)	(-0.360)	(2.464)
Inflation	-0.000899***	1.41e-05	-0.00469*	-0.000372*	-0.000395*	-0.189***
	(-4.316)	(0.0576)	(-1.801)	(-1.848)	(-1.817)	(-8.215)
Openness	0.0163***	0.0137***	0.0198***	0.0202***	0.0312***	0.0281***
	(8.218)	(3.472)	(5.000)	(5.624)	(4.471)	(5.484)
M2 to GDP	0.000109***	0.000114	2.15e-05			
	(3.443)	(1.400)	(0.692)			
M2 to GDP $\times I$(M2 bubble)	-2.56e-05	-2.01e-06	-2.54e-05			
	(-1.501)	(-0.0359)	(-1.613)			
Stk Cap to GDP				4.66e-05**	-2.35e-05	6.27e-05***
				(2.096)	(-0.440)	(3.095)
Stk Cap to GDP $\times I$(StkCap bubble)				-1.33e-05	3.91e-05	-2.92e-05***
				(-0.935)	(1.166)	(-2.772)
Constant	0.240***	0.173***	0.169***	0.271***	0.300***	0.522***
	(14.74)	(5.436)	(5.391)	(9.187)	(5.409)	(11.18)
Observations	2,923	503	529	1,237	290	393
R-squared	0.139	0.147	0.276	0.198	0.195	0.497
Number of countryno	150	19	23	102	19	23
Adjusted R2	0.0906	0.102	0.234	0.122	0.119	0.457

t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4: Growth volatility
Dependent variable: 10-year subsequent growth volatility

	(1)	(2)	(3)	(4)	(5)
log(GDP per capita)	0.470***	0.449	0.571***	0.651***	-0.00180
	(2.598)	(1.055)	(2.819)	(3.155)	(-0.00404)
log(Education)	-1.381***	-1.588***	-1.345***	-1.295***	-1.279**
	(-7.998)	(-3.215)	(-7.146)	(-6.742)	(-2.547)
Size of Govt	0.221	0.361	0.257	0.172	0.452
	(1.104)	(0.855)	(1.157)	(0.761)	(1.068)
Inflation	0.00593	0.0123	0.00510	-0.0119	0.0119
	(0.318)	(0.719)	(0.263)	(-0.480)	(0.693)
Openness	0.0446	-0.424	0.0626	0.0713	-0.522
	(0.227)	(-1.040)	(0.297)	(0.334)	(-1.275)
Market Cap to GDP		0.00400**			0.00396**
		(2.212)			(2.182)
M2 to GDP			-0.00488	-0.00679*	
			(-1.359)	(-1.882)	
Lagged GDP growth				-0.0323**	0.0599**
				(-1.997)	(2.441)
Constant	4.119***	6.101*	3.280*	2.728	8.921**
	(2.752)	(1.733)	(1.915)	(1.573)	(2.478)
Observations	2,556	803	2,317	2,285	797
R-squared	0.027	0.024	0.027	0.026	0.032
Number of countryno	146	94	146	146	94
Adjusted R2	-0.0340	-0.114	-0.0410	-0.0436	-0.107

t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5: Robustness Check: Sample
Dependent variable: Five-year average of subsequent real GDP per capita growth

	EM			DM			EM & DM		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
log(GDP per capita)	-5.638***	-3.150***	-5.532***	-7.951***	-4.219***	-7.020***	-6.113***	-3.013***	-5.845***
	(-7.975)	(-7.449)	(-7.736)	(-16.97)	(-10.70)	(-11.37)	(-14.31)	(-10.81)	(-12.03)
log(Education)	0.999	0.394	1.123	3.014***	5.257***	3.281***	2.512***	1.065***	2.381***
	(1.055)	(0.775)	(1.124)	(5.136)	(8.418)	(4.230)	(4.636)	(2.953)	(3.907)
Size of Govt	-0.579	0.865*	-0.200	2.237***	-1.410**	3.463***	0.476	0.519	0.396
	(-0.620)	(1.744)	(-0.202)	(2.724)	(-2.373)	(3.211)	(0.776)	(1.430)	(0.581)
Inflation	-0.0350	0.000791	-0.0329	-17.99***	-0.567**	-14.73***	-0.0370**	-0.00362	-0.0347**
	(-1.629)	(0.0325)	(-1.520)	(-7.529)	(-2.191)	(-5.116)	(-2.131)	(-0.180)	(-1.976)
Openness	2.770***	1.346***	3.128***	2.739***	1.897***	2.504***	2.479***	1.306***	3.064***
	(3.986)	(3.428)	(4.132)	(5.235)	(4.796)	(4.079)	(5.731)	(4.808)	(6.390)
Market Cap to GDP	0.0246***		0.0270***	0.00717*		0.00866*	0.0136***		0.0166***
	(2.774)		(2.976)	(1.894)		(1.968)	(3.475)		(3.679)
(Market Cap to GDP)^2	-7.46e-05***		-7.91e-05***	-1.06e-05		-8.08e-06	-3.08e-05***		-4.07e-05***
	(-2.895)		(-3.037)	(-1.126)		(-0.693)	(-2.860)		(-3.156)
M2 to GDP		0.0546***	-0.0320		0.0154**	-0.0171		0.0287***	-0.0338***
		(2.706)	(-1.053)		(2.227)	(-1.556)		(3.682)	(-2.750)
(M2 to GDP)^2		-0.000260**	0.000109		-6.31e-05**	1.41e-05		-0.000123***	7.91e-05*
		(-2.335)	(0.706)		(-2.395)	(0.368)		(-3.920)	(1.750)
Constant	37.73***	18.93***	35.14***	50.58***	15.80***	38.65***	37.38***	18.02***	34.94***
	(6.422)	(5.851)	(5.567)	(10.77)	(5.089)	(5.646)	(9.853)	(8.005)	(7.676)
Observations	290	503	289	393	529	319	683	1,032	608
R-squared	0.216	0.157	0.221	0.489	0.281	0.538	0.256	0.158	0.292
Number of countryno	19	19	19	23	23	23	42	42	42
Adjusted R2	0.142	0.112	0.141	0.448	0.239	0.488	0.199	0.117	0.228

t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6: Non-overlapping observations
Dependent variable: Five-year average of subsequent real GDP per capita growth

	Full Sample			EM			DM		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
log(GDP per capita)	-6.591***	-3.932***	-5.599***	-5.951***	-2.950***	-5.822***	-10.14***	-5.200***	-8.617***
	(-7.170)	(-8.944)	(-5.820)	(-3.020)	(-2.781)	(-2.889)	(-8.674)	(-5.336)	(-5.839)
log(Education)	3.236***	1.224***	3.220***	-1.774	-0.405	-1.092	3.043**	5.829***	1.231
	(2.959)	(3.067)	(2.798)	(-0.671)	(-0.330)	(-0.393)	(2.097)	(4.080)	(0.623)
Size of Govt	0.608	-0.730	0.762	3.692	2.171*	3.251	2.055	-3.385**	2.014
	(0.574)	(-1.413)	(0.714)	(1.025)	(1.668)	(0.886)	(0.948)	(-2.330)	(0.754)
Inflation	-0.0145	0.0187	-0.00374	5.61e-06	0.0376	0.00286	-18.07***	-0.346	-14.36*
	(-0.515)	(0.594)	(-0.133)	(0.000175)	(1.234)	(0.0878)	(-3.162)	(-0.703)	(-1.985)
Openness	2.293**	1.829***	2.948***	4.458**	1.395	4.932*	3.231**	2.170**	3.188**
	(2.499)	(3.973)	(3.073)	(2.078)	(1.419)	(1.992)	(2.381)	(2.221)	(2.097)
Market Cap to GDP	0.01000		0.0161	0.0260		0.0282	0.00849		0.0192
	(0.878)		(1.326)	(0.961)		(0.994)	(0.652)		(1.298)
(Market Cap to GDP)^2	-1.69e-05		-3.08e-05	-8.09e-05		-7.98e-05	-4.80e-06		-3.35e-05
	(-0.455)		(-0.792)	(-0.959)		(-0.926)	(-0.128)		(-0.806)
M2 to GDP		0.00981	-0.0414***		0.110**	0.0146		0.0117	-0.0610**
		(0.818)	(-2.699)		(2.073)	(0.151)		(0.707)	(-2.188)
(M2 to GDP)^2		-5.29e-05	3.79e-05		-0.000719**	-0.000267		-5.44e-05	0.000168
		(-1.077)	(0.785)		(-2.326)	(-0.515)		(-0.855)	(1.675)
Constant	37.15***	24.93***	26.95***	34.03*	15.55*	29.32	71.02***	27.91***	67.84***
	(4.270)	(6.808)	(2.905)	(1.833)	(1.849)	(1.513)	(5.116)	(3.514)	(3.686)
Observations	268	618	253	59	99	59	86	111	72
R-squared	0.280	0.183	0.338	0.292	0.263	0.318	0.623	0.418	0.698
Number of countryno	98	149	98	19	19	19	23	23	23
Adjusted R2	-0.179	-0.0908	-0.143	-0.244	0.0108	-0.275	0.429	0.210	0.465

t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7: Robustness Check: Newey West
Dependent variable: Five-year average of subsequent real GDP per capita growth

	Full Sample				EM		DM	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
log(GDP per capita)	-5.096***	-3.665***	-5.306***	-3.675***	-5.638***	-3.150***	-7.951***	-4.219***
	(-7.569)	(-9.166)	(-7.180)	(-9.143)	(-4.421)	(-5.728)	(-8.591)	(-7.070)
log(Education)	3.253***	0.593*	3.166***	0.529	0.999	0.394	3.014***	5.257***
	(4.556)	(1.849)	(4.448)	(1.640)	(0.537)	(0.504)	(3.850)	(6.593)
Size of Govt	-0.0863	-0.0250	-0.0434	-0.0450	-0.579	0.865	2.237*	-1.410
	(-0.146)	(-0.0593)	(-0.0737)	(-0.107)	(-0.494)	(1.102)	(1.765)	(-1.295)
Inflation	-0.0372	-0.0902	-0.0362	-0.0903	-0.0350	0.000791	-17.99***	-0.567*
	(-1.524)	(-1.375)	(-1.510)	(-1.376)	(-1.475)	(0.0253)	(-3.980)	(-1.741)
Openness	2.045***	1.639***	1.960***	1.610***	2.770**	1.346**	2.739***	1.897***
	(3.299)	(4.427)	(3.176)	(4.353)	(2.366)	(2.267)	(3.159)	(3.223)
Market Cap to GDP	0.00334		0.00986*		0.0246*		0.00717	
	(1.516)		(1.760)		(1.811)		(1.423)	
(Market Cap to GDP)^2			-1.98e-05		-7.46e-05**		-1.06e-05	
			(-1.522)		(-2.138)		(-0.834)	
M2 to gdp		0.00949*		0.0191**		0.0546*		0.0154
		(1.704)		(2.232)		(1.672)		(1.487)
(M2 to GDP)^2				-4.68e-05*		-0.000260		-6.31e-05
				(-1.928)		(-1.448)		(-1.324)
Constant	26.42***	26.44***	28.63***	26.73***	42.04	22.84	53.52	16.74
	(4.462)	(7.441)	(4.370)	(7.456)				
Observations	1,237	2,923	1,237	2,923	290	503	393	529

t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Bibliography

Allen, Franklin, and Douglas Gale, 2000, *Comparing Financial Systems* (MIT Press, Cambridge).

Ananchotikul, Sudarat, and Barry Eichengreen, 2009, Corporate governance reform in emerging markets: How much, why, and with what effects?, *Journal of The Japanese and International Economies* 23, 149–176.

Arcand, Jean-Louis, Enrico Berkes, and Ugo Panizza, 2012, Too much finance?, IMF Working Paper No. WP/12/161.

Barro, Robert J., 1998, *Determinants of Economic Growth: A Cross-Country Empirical Study* (MIT Press, Cambridge).

Beck, Thorsten, 2012, Finance and growth–lessons from the literature and the recent crisis, Note prepared for the LSE Growth Commission. Available at `http://www.lse.ac.uk/researchAndExpertise/units/growthCommission/documents/pdf/contributions/lseGC_beck_Finance.pdf`.

Beck, Thorsten, Berrak Büyükkarabacak, Felix Rioja, and Neven Valev, 2009, Who Gets the Credit? And Does It Matter? Household vs. Firm Lending across Countries, European Banking Center Discussion Paper No. 2009-12.

Beck, Thorsten, Hans Degryse, and Christiane Kneer, 2012, Is more finance better? dientangling intermediation and size effects of financial systems, European Banking Center Discussion Paper No. 2012-016.

Beck, Thorsten, and Ross Levine, 2004, Stock markets, banks, and growth: Panel evidence, *Journal of Banking and Finance* 28, 423–442.

Beck, Thorsten, Ross Levine, and Norman Loayza, 2000, Finance and the sources of growth, *Journal of Financial Economics* 58, 261–300.

Cecchetti, Stephen, and Enisse Kharroubi, 2012, Reassessing the impact of finance on growth, BIS Working Paper No 381.

Diamond, Douglas W., and Philip H. Dybvig, 1983, Bank runs, deposit insurance, and liquidity, *Journal of Political Economy* 91, 401–419.

Easterly, William, Roumeen Islam, and Joseph E. Stiglitz, 2000, Shaken and stirred: Explaining growth volatility, The World Bank.

Goldsmith, R. W., 1969, *Financial Structure and Development* (Yale University Press, New Haven).

Kaminsky, Graciela L., and Carment M. Reinhart, 1999, The twin crises: The causes of banking and balance-of-payments problems, *American Economic Review* 89, 473–500.

King, Robert G., and Ross Levine, 1993, Finance and growth: Schumpeter might be right, *The Quarterly Journal of Economics* 28, 717–736.

Levine, Ross, 2005, Finance and growth: Theory and evidence, in Philippe Agion, and Steven N. Durlauf, eds., *Handbook of Economic Growth*, 865–934 (Elsevier B.V.).

Levine, Ross, Norman Loayza, and Thorsten Beck, 2000, Financial intermediation and growth: Casuality and causes, *Journal of Monetary Economics* 46, 261–300.

Levine, Ross, and Sara Zervos, 1998, Stock markets, banks, and economic growth, *American Economic Review* 88, 537–558.

Loayza, Norman, and Romain Ranciere, 2005, Financial development, financial fragility, and growth, IMF Working Paper No. WP/05/170.

McKinsey Global Institute, 2013, *Financial Globalization: Retreat or Reset?* (Global Capital Markets 2013. Available at `http://www.mckinsey.com/insights/global_capital_markets/financial_globalization`).

Newey, Whitney K., and Kenneth D. West, 1987, A simple, positive semi-definite, heteroskedasticity and autocorrelation consistentcovariance matrix, *Econometrica* 55, 709–708.

Papaioannou, Elias, 2007, Finance and growth: A macro economic assessment of the evidence from a european angle, ECB Working Paper Series No 787 (European Central Bank).

Rajan, Raghuram G., 2005, Has financial development made the world riskier?, NBER Working Paper No. 11728.

Rajan, Raghuram G., and Luigi Zingales, 1998, Financial dependence and growth, *American Economic Review* 88, 559–586.

Rousseau, Peter L., and Paul Wachtel, 2011, What is happening to the impact of financial deepening on economic growth, *Economic Inquiry* 49, 276–288.

World Economic Forum, 2012, *Financial Development Report 2012* (`http://www.weforum.org/reports/financial-development-report-2012`).

Table 8: Data Appendix

Variable	**Description**	**Source**
5-year GDP per capita growth	5-year average growth of GDP per capita at constant prices	*Penn World Table* version 8
GDP per capita	GDP per capita at current prices	The World Bank's *World Development Indicators*
Volatility of GDP per capita	10-year rolling standard deviation of GDP per capita growth	*Penn World Table* version 8
Education	Gross secondary level school enrollment	The World Bank's *World Development Indicators*
Size of government	General government final consumption expenditure (% of GDP)	The World Bank's *World Development Indicators*
Inflation rate	Inflation, consumer prices (annual %)	The World Bank's *World Development Indicators*
Stock market capitalization	Market capitalization of listed companies (% of GDP)	The World Bank's *Global Financial Development Database*
M2	Money and quasi money (M2) (% of GDP)	The World Bank's *World Development Indicators*