Financial structure and economic growth nexus revisited

Abstract

This paper empirically reassesses the long-debated relationship between the financial structure and economic growth. Specifically, we examine whether the effect of financial structure on economic growth is affected by the occurrence of banking crisis and economic volatility, the level of financial development, and the financial structure disproportion. We employ the generalized method of moments estimation to a panel of 99 countries over the 1971-2015 period. Although the main result supports the market-based view, the positive effect of the securities market development relative to the banking system weakens significantly if the financial structure is unbalanced. Our findings are robust to a variety of sensitivity checks, including different measures of financial structure, time periods, and model specifications.

JEL classification: E44; G20; O16
Keywords: financial structure; unbalanced financial system; economic growth

Highlights

- This paper studies the effect of the financial structure on economic growth.
- The result supports the market-based view.
- Banking crises and macro-economic volatility do not affect the relationship between the financial structure and growth.
- The role of stock market over banks strengthens with the development of the financial sector.
- Unbalanced financial structure weakens the dominating role of the securities market.

1. Introduction

Although most empirical evidence demonstrates that financial development has a positive long-run impact on economic growth, there is no consensus in both theoretical and empirical evidence on the effect of financial structure on economic growth. Some theoretical models emphasize the benefits of bank-based financial system while others underline the advantages of financial system that rely more on securities markets. According to Levine (2003), the financial system as a whole has five functions to mitigate the problems caused by market frictions, including resource allocation, corporate governance monitoring, risk reduction, saving mobilization, and transaction facilitation. The four competing theories of financial structure, including bank-based, market-based, financial services, and law and finance view are constructed based on the role of banks and securities markets in providing such financial functions. We discuss them briefly below.

The bank-based view criticizes the drawbacks of the securities market and stresses that banks can mitigate these drawbacks. A well-developed securities market quickly reveals information, reducing the individual investors' incentives to collect and analyze information. As a result, a well-developed securities market may hinder the process of identifying innovative projects that promote economic growth (Stiglitz, 1985). Uncoordinated market may be ineffective in monitoring managers due to asymmetric information, free-rider problem, and surreptitious relationship between boards of directors, large shareholders, and managers (Stiglitz, 1985; Jensen, 1993; Allen and Gale, 2000). Moreover, liquid securities markets may encourage myopic investment, leading to inefficient corporate governance and resource allocation (Bhide, 1993).

In contrast, the proponents of market-based view depreciate the role of banks in providing financial functions. A banking system with a huge influence over the firms and bias toward prudence can impede the firms from undertaking innovative, profitable projects (Hellwig, 1991; Rajan, 1992; Morck and Nakamura, 1999; Weinstein and Yafeh, 1998). A long-run relationship between banks and firms' managers can lead them to act against the interests of other stakeholders (Black and Moersch, 1998). Finally, a bank-based system may be only good in providing inexpensive, basic risk management for standardized situations, leaving the advanced services for flexible and complicated demand for the stock-based system (Levine, 2002).

The financial services view argues that the issue is the overall development of financial system, not the particular institutional arrangements such as banks or securities markets. Banks and markets may act as complement rather than substitution in providing growth-enhancing financial services to the economy (Boyd and Smith, 1998; Levine and Zervos, 1998). La Porta, Lopez-de-Silanes, Shleifer, and Vinshy (2000) argue that legal system differences across countries determine the differences in the financial system. The legal rights and enforcement mechanism ensure the quantity and quality of services provided by financial system, which then influence resource allocation and economic growth.

In the early 21st centuries, a series of papers find that the financial structure is not relevant for economic growth (Beck, Demirgüç-Kunt, Levine, and Maksimovic, 2000; Demirgüç-Kunt and Maksimovic, 2002; Levine, 2002; Beck and Levine, 2002; Ndikuman, 2005). However, recent papers with more technical econometric approach provide the contradicting evidence that financial structure does matter. Some of them are in favor of market-based view while the others claim that a bank-based financial system enhances economic growth (Demirgüç-Kunt, Feyen, and Levine, 2013; Castro, Kalatzis, and Martins-Filho, 2015; Liu and Zhang, 2018).

In this paper, we re-examine the relationship between financial structure and economic growth, in terms of size, activity, and efficiency. However, our aims are different from the previous research and we make new contributions to the current literature in the following ways.

First, we check whether the macro-economic volatility and banking instability affect the relationship between the financial structure and economic growth. Kaminsky and Reinhart (1999), Rousseau and Wachtel (2011), Schularick and Taylor (2012), and Ductor and Grechyna (2015) mention that macroeconomic volatility, financial, and banking crises caused by excessive financial deepening or rapid credit growth weaken the connection between the financial development and economic growth.

Second, we propose that the relationship between financial structure and economic growth may vary according to the level of financial development. There has been a great number of research identifying that finance has a different impact on economic growth in different countries, regions, economic development levels, time periods, and financial development levels (De Gregorio and Guidotti, 1995; Deidda and Fattouh, 2002; Rioja and Valev, 2004a; Rioja and Valev, 2004b; Huang and Lin, 2009; Beck, Degryse, and Kneer, 2014). De Gregoio and Guidotti (1995), Levine and Zervos (1998), Levine, Loayza, and Beck (2000), and Rioja and Valev (2004b) conclude that the impact of financial development on growth changes as the financial development level changes. They also point out several theoretical explanations for this relationship, including economies of scales, learning-by-doing effects, and the law of diminishing returns (Rioja and Valev, 2004b).

Third, we investigate whether the effects of financial structure on economic growth in the balanced financial system are different from those in the unbalanced financial system. Previously, Cuadro-Sáez and García-Herrero (2008) find that a more balanced financial structure is associated with higher economic growth. If there exists a difference, it can explain why some research concludes that the financial structure is irrelevant for economic growth.

To achieve these objectives, we use a panel dataset of 99 countries over the period 1971 – 2015 and the system generalized method of moments (GMM) to estimate the impact of financial structure on economic growth. We employ two approaches of Levine (2002) and Cuadro-Sáez and García-Herrero (2008) to measure financial structure and identify the unbalanced financial system. We allow for the interaction between the main variables of interest (financial structure indicators) and the variables that reflect macro-economic volatility, banking crisis, financial development, as well as the unbalancedness of the financial system.

We obtain several interesting findings, which are stable in extensive robust analyses. First, financial structure activity and efficiency matter for economic growth but the size of financial structure does not. Second, banking crises and economic volatility do not significantly change the relationship between financial structure and economic growth. Third, the role of stock market over banks increases with the development of the financial sector. Fourth, the positive impact of higher stock market development relative to banking sector development is reverted if the country's financial structure is unbalanced toward stock markets. Although our result is in favor of the market-based view, it also implies that for a country to receive benefit from higher development in financial structure, it must have a balanced financial system first.

The rest of this paper is organized as follow. Section 2 provides an overview of literature on the financial structure and growth relationship. Section 3 presents data and model specification. Section 4 reports the main results and robustness checks. Section 5 concludes the paper.

2. Literature review

Based on four competing financial structure theories, there has been a growing number of literature on the effect of financial structure on economic activities. Overall, early research on the financial structure and growth nexus provide supporting evidence for the financial services and law. However, recent studies have verified that the financial structure, bank-based or market-based financial system, matters for economic growth.

One of the pioneer studies on the financial structure and economic growth nexus is the seminar of Beck et al. (2000). In this paper, they use different methodologies for three cross-country-, industry-,

and firm-level dataset to investigate the relationship between the financial structure and economic development. First, using a sample of 48 countries with data being averaged over the period 1980 – 1985, they find that the financial structure is not significantly related to economic growth while the financial development is positively correlated with economic growth. Second, the industry-level data of 34 countries and 36 industries indicate that the overall level of financial development, but not a specific structure of financial system, affects industry growth rate and the creation of new firms. Third, they use panel firm-level data from 1990 to 1995 to examine whether firms' access to external finance varies across financial system with different structures. Again, the result is similar to the above findings. Overall, firms do not grow faster in either market- or bank-oriented financial system. The financial development level and legal environment are critical determinants of economic growth. Demirgüç-Kunt and Maksimovic (2002) use firm-level data from 40 countries to check whether firms' access to external funds for growth differs in bank-oriented and market-oriented financial systems. The result reveals that the effect of the financial development on firms' growth is associated with the development of a country's contracting environment. Moreover, the relative development of stock market over banking system is not a robust predictor of the firms' access to external financing. Their finding is consistent with the financial services and law views. A highly cited paper by Levine (2002) explores the financial structure and economic growth relationship under four competing theories, including bank-based, market-based, financial services, and law views. He proposes three measures of the financial structure, in terms of size, activity, and efficiency. Using a data set of 48 countries from 1980 to 1985, he finds that financial structure is not significantly associated with economic growth, capital allocation, and the individual sources of growth. This finding indicates that both bank-based and market-based theories are not relevant for economic growth but provides a strong support for the financial services view. Similarly, Ndikuman (2005) finds that the financial system development, not the financial structure, has a positive effect on the domestic investment. Beck and Levine (2002) investigate whether bank-based or market-based financial system has an impact on the growth, establishment of firms, and capital allocation efficiency across industries. The result does not support bank-based or market-based theory but the overall finance development and legal system efficiency are what matter for economic growth. Cuadro-Sáez and García-Herrero (2008) criticize the common measurement of financial structure (proposed by Levine (2002)) and recommend a new measure of the financial structure's balancedness. The result indicates that a more balanced financial structure, in terms of the banking relative to the capital market, supports economic growth. Their finding implies the complementary rather than substitution relationship between banks and capital markets.

In sharp contrast, recent studies employing the same data set, larger sample size, and longer period, indicate that the financial structure exerts a significant effect on economic growth. Pinno and Serletis (2007) investigate the potential for heterogeneity in the relationship between the financial structure and economic growth in Levine (2002)'s cross-country data set. They find evidence that developing countries benefit from the bank-based financial system while developed ones profit from the market-based financial system. Ergungor (2008) research on how the financial system structure affects economic growth for 48 countries from 1980 to 1995, which are previously analyzed in Levine (2002). Ergungor (2008) employs a variety of financial structure, financial development, as well as economic, social, and political variables. The result indicates that the financial system structure matters for economic growth. Specifically, a bank-oriented financial system boots economic growth, especially the capital stock component, in countries with inflexible judicial systems. Baum, Schäfer, and Talavera (2011) study whether a country's financial structure affects the firm's obstacles in obtaining external funds. They follow Levine (2002) to use two measures of financial structure, size and activity. Employing the data of 5,500 manufacturing firms from 35 countries over the period 1989 - 2006, they find that both financial structure activity and size play an important role in reducing obstacles to firm's access to external finance. Although the result supports the bank-based view, the authors emphasize that both banks and stock markets have their own pros and cons. Luintel, Khan, Arestis, and Theodoridis (2008) criticize the research, which employ multi-country, -industry, and – firm level dataset. They propose the use of time-series and dynamic heterogeneous panel method to overcome the problems of cross-country heterogeneity and unbalanced cross-country growth path. The result indicates that both financial structure and development are predictors of economic growth. Moreover, there is little support for Boyd and Smith (1998)'s prediction that the role of market based financial system rises as the economy grows.

Other studies find evidence in favor of market-based financial system with more technical econometric approaches. Yeh, Huang, and Lin (2013) show that the financial structure is correlated with both economic growth and its volatility. Using a panel dataset of 40 countries from 1960 to 2009,

they find that a more market-based financial system supports country to develop faster although it also leads to higher volatility in the long-run. Another study that does not support the financial service view but reinforces the market-based view is of Luintel, Khan, Leon-Gonzalez, and Li (2016). They analyze a sample of 33 high-income and 36 middle- and low-income countries over the period 1989-2011 using the Bayesian framework. A more market-based financial system relative to a bank-based one contributes to economic growth in high-income countries. Moreover, neither the financial structure nor the financial development matters for economic growth in middle- and low-income countries. Castro et al. (2015) investigate the effect of financial system on the investment decisions of Brazilian firms from 1998 to 2006. After controlling for the financial development level, the generalized method of moments estimation result shows that the investment behavior of financially constrained firms is strongly affected by the financial structure. The finding supports the market-based view to alleviate the firm's dependence on internal resources. Liu and Zhang (2018) use the two-stage least square and generalized method of moments to explore the endogenous mechanism between financial structure and economic growth in China's provinces over the period from 1996 to 2013. Their finding support the market-based view as the financial structure has a significant impact on economic growth. However, its effect on economic growth varies across regions and presents an inverse U-shape.

Another literature strand suggests that both banks and markets are important for growth but their relative role changes with economic development (Boyd and Smith, 1998; Rajian and Zingales, 1998; Lin, Sun, and Jiang, 2009; Thumrongvit, Kim, and Pyun, 2013; Demirgüç-Kunt et al., 2013). Demirgüç-Kunt et al. (2013) use quantile regresion to see how the effects of banks and securities market on economic growth varies with the economic development. They find that as the economies develop, the role of securities markets in promoting economic growth increases while the role of banks decreases. In other words, the banking system has an influent role in boosting growth at the early stages of economic development. However, as the economy grows, the leading role is transferred to the stock and bond market.

However, not only there are no consensus in the literature on financial structure and growth relationship, but the literature often ignore the fact that unbalanced financial structure or other macroeconomic distortions may affect the way the financial structure affects economic activities. In this paper, we close the gap by examining how the effect of financial structure evolves with the financial development, the "unbalancedness" of financial structure, and the macroeconomic instability.

3. Data and model specification

3.1. Data

We follow mainstream literature, such as Beck, Demirgüç-Kunt, and Levine (2000) and Levine (2002), to measure financial structure in three dimensions, including size, activity, and efficiency.

The first indicator, financial structure size, is the measure of the size of stock market[1] relative to the size of financial intermediaries. The size of the stock market is measured by the stock market capitalization to GDP ratio. We use the deposit money banks assets to GDP ratio to measure the size of financial intermediaries. Thus, the financial structure size indicator is the logarithm of stock market capitalization to GDP divided by the deposit money banks assets to GDP. A higher financial structure size implies a more market-based financial system. Our indicator is different from Levine (2002) and Yeh et al. (2013), who use the private credit by deposit money banks to GDP to measure the size of financial intermediaries. According to Beck et al. (2000), the absolute size measures of financial intermediaries include the deposit money banks assets to GDP (and other financial institutions assets to GDP) on the asset side and the liquid liabilities to GDP on the liability side of the balance sheet.

The second indicator, financial structure activity, is the measure of the activity of stock market relative to the activity of financial intermediaries. To measure the activity of stock market, we use the stock market turnover ratio. To measure the activity of financial intermediaries, we use the private credit by deposit money banks and other financial institutions to GDP. The financial structure activity is the logarithm of stock market turnover ratio divided by the private credit by deposit money banks and other financial institutions. A higher value of financial structure activity means that the financial system is a more market-based one. We use the private credit by deposit money banks and other financial institutions instead of private credit by deposit money banks only because the former includes claims by both deposit money banks and other financial institutions. Moreover, since the 21st century, the private credit by deposit money banks and other financial institution has diverged from private credit by deposit money banks due to the fast development of other financial institutions.

[1] The data on the corporate bond market from Bank for International Settlements starts in 1989 and the country coverage has been quite limited. Thus, we limit our securities market to stock market only.

The third indicator, financial structure efficiency, is the measure of the efficiency of stock market relative to the efficiency of financial intermediaries. The stock market turnover ratio is used to measure the efficiency of the stock market. We use the overhead costs, which equals the accounting value of a bank's overhead costs as share of its total assets, to measure the efficiency of financial intermediaries. The financial structure efficiency is the logarithm of the stock market turnover ratio times overhead costs. A larger value of financial structure efficiency implies a more market-based financial system.

Cuadro-Sáez and García-Herrero (2008) argue that the Levine (2002)'s measurement of financial structure suffers two problems. First, being the natural logarithm of a ratio, the indicator is neither bounded nor linear. The indicator equals infinite or minus infinite when the size of one of the two financial system components is zero or approach zero. Second, an increase in the stock market development relative to the financial intermediaries has a different impact on the indicator depending on the initial size of the markets' sector. They propose a new indicator of "balancedness" of the financial structure, which solves the above problems. It is measured as the absolute value of the difference between stock markets' and financial intermediaries' development divided by the sum of them. The minimum value, which equals zero, stands for a balanced financial system. Higher value of the indicator means higher level of financial structure disproportion. In this paper, we modify the indicator of Cuadro-Sáez and García-Herrero (2008) with one modification. We do not take the absolute value of the ratio as we want to see the impact of financial structure on economic growth as well as to compare the results with Levine (2002)'s indicators.

The dependent variable is the annual growth rate of real GDP per capita. We control for other potential determinants of economic growth by using other variables that are often used in the literature. The initial real GDP per capita control for convergence effect as poorer economies will tend to grow more rapidly than wealthier ones. Other explanatory variables are government final consumption expenditure over GDP (to measure fiscal policy), total export and import of goods and services over GDP (to measure trade openness), average year of schooling (to measure education level), and inflation rate (to measure economic stability or the distortions in financial intermediation).

All control variables are transformed into the logarithm form. Our panel dataset includes 99 countries and territories. The time component ranges from 1971 to 2015. To focus on the long-run relationship between financial structure and economic growth, the data are averaged over non-overlapping 5-year periods. Moreover, the dataset is averaged to validate the use of the GMM estimator, which requires a large number of cross-section units and a small number of time periods. All data, except for average years of schooling data, is taken from the World Development Indicator and Global Financial Development published by the World Bank. The average years of schooling data are taken from Barro and Lee (2013). Table A in Appendix presents the definition and source of all financial variables. Table B in Appendix reports the descriptive statistics of all variables in our dataset.

3.2. Model specification

To measure the effects of financial structure on economic growth in a panel data, we use the system GMM estimator developed by Arellano and Bover (1995) and Blundell and Bond (1998). The system GMM is preferred over pooled ordinary least squares, fixed effect, and difference GMM estimators because it is consistent in estimating parameters and unbiased. Moreover, the system GMM can handle the endogeneity problem that some explanatory variables might not be exogenous or predetermined. Our proposed model is of the following form:

$$y_{i,t} = \alpha y_{i,t-1} + \beta FS_{i,t} + \delta' X_{i,t} + \eta_i + \varepsilon_{i,t} \quad (1)$$

where $y_{i,t}$ is the real GDP per capita growth rate, $FS_{i,t}$ is the measure of financial structure, $X_{i,t}$ represents the set of other explanatory variables, η_i is country specific-effects, $\varepsilon_{i,t}$ is the error term, $i \in \{1,2,\dots,N\}$ and $t \in \{1,2,\dots,T\}$ stand for country and period indices, respectively. We also include time dummies to capture time fixed-effects.

We use two-step estimator for system-GMM estimators proposed by Arellano and Bond (1991) and obtain robust standard errors using the Windmeijer (2005) finite sample correction. We reduce the instruments count to one to minimize the over-fitting problem ($p=1$) but also use all available lags ($p=t$) for robust check. The consistency of the GMM estimators depends on the validity of the assumption that the error terms do not exhibit serial correlation and on the validity of the instruments. Thus, we use AR (2) test that examines the null hypothesis of zero autocorrelation in the first-differenced errors and the Hansen test of the over-identifying restrictions.

We start our analysis by estimating the effect of financial structure variables, in terms of size, activity, and efficiency, on economic growth. Because the measures of financial structure may suffer from the anomalies in data, which can affect the estimation results, we remove all observations in the bottom 1% and top 1% of financial structure variables.

Second, we analyze whether the effects of financial structure on economic growth changes in the occurrence of banking crises and macro-economic volatility. Several authors suggest that banking crises and macro-economic volatility are related to the effect of financial development on economic growth (Kaminsky and Reinhart, 1999; Schularick and Taylor, 2012; Rousseau and Wachtel, 2011; Arcand, Berkes, and Panizza, 2015). Breitenlechner, Gachter, and Sindermann (2015) conclude that although financial development is positively associated with economic growth in normal time, larger financial sectors lead to significantly worse economic outcomes in the case of a banking crisis. Similarly, Asteriou and Spanos (2018) find that when the crisis period is not included, financial development promotes economic activities, while during the crisis periods, has an adverse effect on economic activity. The banking crisis dummy variable equals 1 if at least one year of each 5-year period expresses two following conditions: significant signs of financial distress in the banking system and significant banking policy intervention measures in response to significant losses in the banking system. The model (1) is modified to include the dummy variable of banking crisis and its interaction with financial structure variables. This modification allows us to test for the presence of the heterogeneous effects in financial structure and economic growth nexus in the banking crises and tranquil periods. We now estimate the following model:

$$y_{i,t} = \alpha y_{i,t-1} + \beta FS_{i,t} + \gamma BCRI_{i,t} + \theta FS_{i,t} BCRI_{i,t} + \delta' X_{i,t} + \eta_i + \varepsilon_{i,t} \quad (2)$$

In this set-up, $BCRI$ is banking crisis dummy variable, β measures the effect of financial structure on economic growth in tranquil periods while $\beta + \theta$ captures the effect of financial structure on economic growth in banking crises periods.

Next, we repeat our experiment with macro-economic volatility by substituting banking crisis dummy variable with a macro-economic volatility dummy variable. We define macro-economic volatility as the within country coefficient of variation of real GDP per capita growth rate for each of 5-year periods and then create a dummy variable that equals 1 for country periods in which volatility is greater than the sample average and zero otherwise. We now estimate the following model:

$$y_{i,t} = \alpha y_{i,t-1} + \beta FS_{i,t} + \epsilon HVOL_{i,t} + \rho FS_{i,t} HVOL_{i,t} + \delta' X_{i,t} + \eta_i + \varepsilon_{i,t} \quad (3)$$

In this set-up, $HVOL$ is high volatility period dummy variable, β measures the effect of financial structure on economic growth in low-volatility periods while $\beta + \rho$ captures the effect of financial structure on economic growth in high-volatility periods.

Third, we focus on whether the effect of financial structure on economic growth varies with financial development level. Rioja and Valve (2004b) find that the impact of financial development on economic growth is not uniformly positive and even when positive, the magnitude differs. Specifically, the financial development only exerts a positive impact on economic growth in its intermediate and high region. Thus, we include an interaction between financial structure and a proxy for financial development into the model (1). We follow Ergungor (2008) to calculate the financial development as the logarithm of the value of stock market total value traded to GDP times the value of private credit by deposit money banks and other financial institutions to GDP. We now estimate the following model:

$$y_{i,t} = \alpha y_{i,t-1} + \beta FS_{i,t} + \pi FS_{i,t} FD_{i,t} + \delta' X_{i,t} + \eta_i + \varepsilon_{i,t} \quad (3)$$

In this set-up, FD is the financial development level. A positive and significant π is taken as evidence in favor that the dominating role of markets over financial intermediaries increases with the level of financial development and vice versa.

Fourth, we further examine whether the effect of financial structure on economic growth changes in the case of an unbalanced financial system. Cuadro-Sáez and García-Herrero (2008) argue that a balanced mix of financial intermediearies and securities markets might be better for economic growth to extreme components. One reason is that one financial market component could serve as an alternative source of funding if the other component is under stress (Greenspan, 1999). The other is

that two financial market components seem to influence economic growth through different, but complementary, channels. Although both banks and securities markets help the capital move from overcapitalized place to undercapitalized one to serve business and consumption activities, the former focus on shifting the short-term capital while the latter is responsible for the medium- and long-term funds. Ancard et al. (2015) stated that the problem of financial development to economic growth would not be one of "too much finance" but one of the wrong type of finance.

Theoretically, a monopoly in the supply of capital to the economy may cause serious consequences for the growth. The first possible explanation is that uncompetitive situation between banks and stock markets may negatively affect the quality of services each financial component provides to the economy. For example, a well-developed stock market can attract labors, or even "steal" talents, from banking system, which results in an inefficient resource allocation in the financial system. In contrast, promoting the under-developed banking system to reach a more balanced financial system will lead to a higher competition level, thereby, reducing borrowing cost and improving the quality of financial services. An alternative explanation relates to the law of diminishing return and economies of scales. If the high return projects are indivisible and require a minimum funding size, banking system needs to develop to a certain size to finance such larger projects. In addition, to provide the risk amelioration through diversification, the banking system must be large enough to hold a diversified portfolio. In contrast, if the stock market develops over its optimal threshold, its positive impact on growth may decline due to the effect of diminishing return. Last, the recent increasing interconnectedness of the banking system and securities market due to transformation of assets and liabilities shows that the development of one financial system component depends greatly on the development of the other (IMF, 2010).

We follow the approaches of Levine (2002) and Cuadro-Sáez and García-Herrero (2008) to define unbalanced financial system. On the one hand, Levine (2002) defines a country with an "unbalanced bank" financial system if its credit to private sectors is lower than the median value of credit to private sectors of all countries while its stock market turnover ratio is larger than the median value of stock market turnover of all countries in the sample. A dummy variable, which equals 1 if a country has an "unbalanced bank" financial system or zero otherwise, is added into model (1). We, then, allow it to interact with the financial structure variables. On the other hand, we adapt from Cuadro-Sáez and García-Herrero (2008)' approach to define "unbalanced financial system". We calculate the ratio between the difference between stock markets and financial intermediaries development divided by the sum of them. The ratio ranges from -1 to 1 and the closer to zero the ratio is, the more balanced financial structure is. We define a country with an "unbalanced bank" financial system if the value of the ratio is positive and in the top 10% (it is equivalent to the size and activity of stock markets are double those of banks). A dummy variable, that equals 1 if the value of the ratio is positive and in the top 10% and zero otherwise, is created and added into model (1). We then allow it to interact with financial structure variables. We now estimate the following model:

$$y_{i,t} = \alpha y_{i,t-1} + \beta FS_{i,t} + \tau UNB_{i,t} + \omega FS_{i,t} UNB_{i,t} + \delta' X_{i,t} + \eta_i + \varepsilon_{i,t} \qquad (4)$$

In this setup, UNB is the "unbalanced bank" financial system dummy variable, β measures the effect of financial structure on economic growth in "balanced" financial system periods while $\beta + \omega$ captures the effect of financial structure on economic growth in "unbalanced bank" financial system periods.

4. Results

4.1. Main results

In this section, we discuss our findings on the effect of financial structure on economic growth in normal times, in banking crises and macro-economic volatility periods, in different financial development level, and in unbalanced financial system.

Table 1 presents the estimation of the effect of financial structure in economic growth. Column (1) to (3) report results when we use the Levine's (2002) traditional financial structure variables while column (4) to (6) report results when we use the financial structure variables adapted from Cuadro-Sáez and García-Herrero (2008). Although all the coefficients of financial structure variables are positive, only coefficients of the financial structure variables in terms of activity and efficiency are statistically significant. While a more market-based financial system, in terms of activity and efficiency, helps country to grow faster, a more market-based financial system in terms of size does not. We also find a catch-up effect as the coefficient of initial GDP per capita is negative and

statistically significant. Higher trade openness and education level are associated with higher economic growth while higher government consumption and inflation are associated with lower economic growth. All the regressions do not reject the null hypothesis of no second-order autocorrelation at 1% and 5% significance levels and do not reject the null hypothesis that all over-identifying restrictions are valid.

Table 1
Effects of financial structure on economic growth.

	(1)	(2)	(3)	(4)	(5)	(6)
	Levine 2002			Cuadro-Sáez & García-Herrero 2008		
FS_size	0.183			0.384		
	(0.203)			(0.609)		
FS_activity		0.642***			1.726***	
		(0.172)			(0.482)	
FS_efficiency			0.386***			1.066**
			(0.137)			(0.473)
Lag of dependent variable	0.131**	0.142***	0.064	0.137**	0.163***	0.065
	(0.055)	(0.055)	(0.051)	(0.055)	(0.058)	(0.053)
Initial per capita GDP	-0.852***	-0.816***	-1.006***	-0.919***	-0.892***	-1.035***
	(0.207)	(0.264)	(0.285)	(0.200)	(0.260)	(0.283)
Government consumption	-1.682***	-1.621**	-1.514	-1.736**	-1.514**	-1.456*
	(0.637)	(0.764)	(0.930)	(0.732)	(0.657)	(0.868)
Trade openness	1.338***	1.705***	0.776*	1.389***	1.560***	0.771*
	(0.496)	(0.403)	(0.426)	(0.486)	(0.375)	(0.466)
Average years of schooling	2.876***	2.693***	2.817***	3.116***	2.742***	2.831***
	(0.694)	(0.878)	(1.000)	(0.672)	(0.854)	(1.034)
Inflation rate	-0.227	-0.306	-0.574**	-0.308	-0.414*	-0.593**
	(0.204)	(0.229)	(0.277)	(0.209)	(0.238)	(0.258)
Constant	4.433	3.490	7.605**	4.622	4.522*	7.717**
	(2.775)	(2.645)	(3.173)	(3.062)	(2.568)	(3.202)
AR(2) p-value	0.771	0.876	0.260	0.790	0.956	0.242
Hansen p-value	0.442	0.546	0.997	0.494	0.585	0.995
Observations	503	498	345	503	498	345
Number of countries	99	98	97	99	98	97

Note: This table reports the estimation results of model (1). The dependent variable is real GDP per capita growth rate. FS_size, FS_activity, and FS_efficiency are the size, activity, efficiency of stock market relative to the size, activity, and efficiency of financial intermediaries. The set of control variables includes time fixed effects, the lag of dependent variable, initial GDP per capita, the log of general government final consumption expenditure over GDP, the log of trade openness, the log of average years of schooling, and the log of inflation rate. Robust standard errors are in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

In Table 2, we analyze whether the effects of the financial structure on economic growth found in Table 1 changes in the occurrence of banking crises and macro-economic volatility. Panel A shows that although all the coefficients associated with the interacted variables are negative, they are not statistically significant at conventional levels. Similarly, Panel B reports that almost coefficients associated with interacted variables between financial structure and macro-economic volatility are not statistically significant. In contrast, all coefficients of financial structure in terms of activity and efficiency are positive and statistically significant. Thus, we can confirm that only financial structure in terms of activity and efficiency significantly associate with economic growth, even in taking into consideration of banking crises and macro-economic volatility. Moreover, the negative coefficients of dummy variables in Table 2 indicate that both banking crises and macro-economic volatility are negatively correlated with economic growth. Overall, the results of both Table 1 and Table 2 are consistent with market-based view that a market-based financial system is associated with higher economic growth rate.

Table 2 Effects of financial structure on economic growth – banking crises and macro-economic volatility

Panel A. Banking crises.

	(1)	(2)	(3)	(4)	(5)	(6)
	Levine 2002			Cuadro-Sáez & García-Herrero 2008		
FS_size	0.036			0.031		
	(0.217)			(0.756)		
FS_activity		0.614***			2.166***	
		(0.152)			(0.456)	
FS_efficiency			0.782***			2.020***
			(0.229)			(0.626)
Banking crisis	-1.393***	-1.799***	-1.875***	-1.447***	-1.829***	-1.650***
	(0.450)	(0.398)	(0.439)	(0.468)	(0.412)	(0.437)
FS_size×banking crisis	-0.377			-1.405		
	(0.395)			(1.161)		
FS_activity×banking crisis		-0.371			-1.310	
		(0.250)			(0.859)	
FS_efficiency×banking crisis			-0.611			-1.954
			(0.474)			(1.192)
AR(2) p-value	0.891	0.699	0.630	0.898	0.867	0.581
Hansen p-value	0.988	0.965	0.216	0.978	0.987	0.167
Observations	499	495	341	499	494	341
Number of countries	98	96	96	98	97	96

Table B. Macro-economic volatility.

	(1)	(2)	(3)	(4)	(5)	(6)
	Levine 2002			Cuadro-Sáez & García-Herrero 2008		
FS_size	0.195			0.561		
	(0.213)			(0.672)		
FS_activity		0.499***			1.512***	
		(0.119)			(0.442)	
FS_efficiency			0.237*			0.889**
			(0.141)			(0.388)
Economic volatility	-3.135***	-2.987***	-2.268***	-2.774***	-2.970***	-2.636***
	(0.743)	(0.535)	(0.327)	(0.695)	(0.766)	(0.448)
FS_size×economic volatility	-0.094			0.527		
	(0.456)			(1.524)		
FS_activity×economic volatility		-0.351			-0.578	
		(0.269)			(0.778)	
FS_efficiency×economic volatility			-0.394**			-0.826
			(0.172)			(0.856)
AR(2) p-value	0.116	0.106	0.714	0.143	0.106	0.825
Hansen p-value	0.867	0.907	0.211	0.891	0.923	1.000
Observations	503	499	353	503	498	345
Number of countries	99	97	98	99	98	97

Note: This table reports the estimation results of model (1), taking into consideration the effects of macro-economic volatility. The dependent variable is real GDP per capita growth rate. FS_size, FS_activity, and FS_efficiency are the size, activity, efficiency of stock market relative to the size, activity, and efficiency of financial intermediaries. The set of control variables includes time fixed effects, the lag of dependent variable, initial GDP per capita, the log of general government final consumption expenditure over GDP, the log of trade openness, the log of average years of schooling, and the log of inflation rate. Banking crisis dummy variable takes value of 1 if a country period is in banking crisis period and zero otherwise. Economic volatility dummy variable takes value of 1 if a country period is in macro-economic volatility period and zero otherwise. Robust standard errors are in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 3 reports the result of the test whether the effect of financial structure on economic growth varies with the level of financial development. We find that financial structure activity and efficiency still exerts a significant and positive impact on economic growth. However, only the interaction between financial structure activity and financial development has a positive and statistically significant coefficient. This result provides evidence that market-based system is more important in promoting economic growth in the later stage of financial development. We also use other proxies for the financial development, including the efficiency of banking system (bank overhead costs) and stock market (stock market turnover ratio), for robustness check. These alternative measures of financial development do not change the main finding (full regression results are available upon request).

Table 3
Effect of financial structure on economic growth – financial development.

	(1)	(2)	(3)	(4)	(5)	(6)
	Levine 2002			Cuadro-Sáez & García-Herrero 2008		
FS_size	0.033			0.192		
	(0.187)			(0.616)		
FS_activity		0.601***			1.115***	
		(0.150)			(0.358)	
FS_efficiency			0.406***			1.231***
			(0.151)			(0.448)
FS_size×financial development	-0.003			-0.006		
	(0.004)			(0.009)		
FS_activity× financial development		0.002*			0.005**	
		(0.001)			(0.002)	
FS_efficiency× financial development			-0.000			-0.004
			(0.004)			(0.006)
AR(2) p-value	0.737	0.927	0.272	0.797	0.858	0.281
Hansen p-value	0.894	0.904	0.999	0.896	1.000	0.999
Observations	496	497	342	496	497	342
Number of countries	97	98	97	97	98	97

Note: This table reports the estimation results of model (1), taking into consideration the effects of financial development. The dependent variable is real GDP per capita growth rate. FS_size, FS_activity, and FS_efficiency are the size, activity, efficiency of stock market relative to the size, activity, and efficiency of financial intermediaries. The set of control variables includes time fixed effects, the lag of dependent variable, initial GDP per capita, the log of general government final consumption expenditure over GDP, the log of trade openness, the log of average years of schooling, and the log of inflation rate. Financial development is the logarithm of the value of the stock market total value traded to GDP times the value of the private credit by deposit money banks and other financial institutions to GDP. Robust standard errors are in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Before examining how the unbalanced financial system affects the relationship between financial structure and economic growth, we primarily check whether the "unbalancedness" of financial system leads to lower economic growth. We first adopt the Cuadro-Sáez and García-Herrero's (2008) approach and find that the higher the "unbalancedness" in terms of financial structure is, the lower economic growth is. Then, we estimate model (4) for three financial structure indicators. Table 4 shows that while the coefficients of financial structure activity and efficiency are positive and statistically significant, almost coefficients of their interaction with under-developed bank financial system dummy variables are significant but negative. It implies that in a country with well-developed stock markets but under-developed banks, increasing the development of the stock market relative to banks do not significantly promote economic growth. Instead, it has a negative impact on economic growth. This finding indicates that to receive benefits of higher development of financial structure in terms of activity and efficiency, a country must have a balanced financial system.

Table 4
Effect of financial financial structure on economic growth – unbalanced financial structure.

	(1)	(2)	(3)	(4)	(5)	(6)
	Levine 2002			Cuadro-Sáez & García-Herrero 2008		
FS_size	0.138			0.699		
	(0.220)			(0.565)		
FS_activity		0.683***			1.584***	
		(0.124)			(0.614)	
FS_efficiency			0.584**			0.870*
			(0.286)			(0.483)
Unbalanced FS_size	-1.853*			-3.210		
	(1.060)			(2.058)		
Unbalanced FS_activity		-0.756			2.227	
		(0.688)			(1.446)	
Unbalanced FS_efficiency			-3.449*			4.100***
			(2.066)			(1.590)
FS_size×unbalanced FS	6.705			6.696		
	(4.560)			(6.689)		
FS_activity×unbalanced FS		-0.776*			-5.286**	
		(0.411)			(2.672)	
FS_efficiency×unbalanced FS			0.996			-6.713**
			(1.160)			(2.964)
AR(2) p-value	0.807	0.649	0.230	0.729	0.741	0.246
Hansen p-value	0.953	1.000	0.104	0.971	1.000	0.194

Observations	503	498	345	503	498	345
Number of countries	99	98	97	99	98	97

Note: This table reports the estimation results of model (1), taking into consideration the role of unbalanced financial structure. The dependent variable is real GDP per capita growth rate. FS_size, FS_activity, and FS_efficiency are the size, activity, efficiency of stock market relative to the size, activity, and efficiency of financial intermediaries. The set of control variables includes time fixed effects, the lag of dependent variable, initial GDP per capita, the log of general government final consumption expenditure over GDP, the log of trade openness, the log of average years of schooling, and the log of inflation rate. Unbalanced_FS_size, unbalanced_FS_activity, unbalanced_efficiency are dummy variables that take value of 1 if a country has a well-developed stock market but under-developed financial intermediaries. Robust standard errors are in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

4.2. Robustness

In this section, we examine whether the main results are robust to other proxies of financial structure, alternative model specification, different periods of time, country sub-groups, and the exclusion of highly developed countries.

First, we use other financial development indicators to calculate financial structure variables. When calculating the financial structure size, we use the assets of all financial institutions to GDP (includes non-banks insurance companies, pension funds, and mutual funds) and the private credit by deposit money banks and other financial institutions to GDP instead of deposit money banks assets to GDP. When calculating the financial structure activity, we use the stock market total value traded to GDP, instead of the stock market turnover ratio, to measure the activity of stock market. The result reveals that these alternative measure of financial structure yield similar conclusion to our baseline one.

Second, we check the sensitivity of our results for alternative model specification. We introduce control variables (government final consumption, trade openness, education level, and inflation rate) gradually into the growth model at a time to study the evolution of the coefficient of financial structure variables. We also use all the available lags as instruments ($p=t$) instead of reducing the instruments count to one ($p=1$). Our main results are robust to the choice of control variables and lags of instruments (full regression results are available upon request).

Moreover, if financial structure matters for economic growth and unbalanced financial system negatively causes harm to economic growth, we futher explore whether there exists a threshold, above which the marginal effect of financial structure on economic growth changes from positive to negative. In other words, we allow for the possibility of a non-linear relationship between financial structure and economic growth by including both the linear and the quadratic terms in the estimation. Then, we use the Lind and Mehlum's (2010) test to check whether the inverted U-shaped relationship exists. We now estimate the following model:

$$y_{i,t} = \alpha y_{i,t-1} + \beta FS_{i,t} + \vartheta FS_{i,t}^2 + \delta' X_{i,t} + \eta_i + \varepsilon_{i,t} \quad (5)$$

In this setup, FS^2 is the quadratic term of financial structure in term of activity. If β is positive and statistically significant while ϑ is negative and statistically significant, the relationship between financial structure and economic growth follows an inverted U-shape.

The first column of Table 5 shows an inverted U-shaped relationship between financial structure activity and economic growth. Specifically, we find that the linear and quadratic terms of financial structure activities are statistically positive and negative, respectively. The point estimate of the regression suggests that the marginal effect of financial structure activity becomes negative when it reaches 168%. The threshold increases to 180% for the period 1976-2015 (column 2) and 174% for the period 1981-2015 (column 3). We also check the results with other financial structure variable, which is the ratio of the stock market turnover to the domestic credit by deposit money banks to GDP. The results of column 4 to 6 confirm the above results. The threshold for three periods, 1971-2015, 1976-2015, and 1981-2015 are slightly lower than what are found above (165%, 171%, and 174%, respectively). Moreover, we use spline regression to allow for different slopes associated with financial structure activity variables when they reach the threshold levels. Results show that the coefficients of financial structure variables are positive and statistically significant when these variables are below threshold levels. In contrast, financial structure variables are negatively and significantly correlated with economic growth when they are above threshold levels (full regression results are available upon request).

Table 5
Effects of financial structure on economic growth – non-monotonic relationship.

	(1)	(2)	(3)	(4)	(5)	(6)
FS_activity_1	0.888*	0.990**	1.034**			
	(0.471)	(0.434)	(0.485)			
FS_activity_1_squared	-1.759***	-1.739***	-1.915***			
	(0.612)	(0.625)	(0.702)			
FS_activity_2				0.954**	1.010**	1.042**
				(0.425)	(0.439)	(0.521)
FS_activity_2_squared				-1.953***	-1.920***	-1.928***
				(0.745)	(0.720)	(0.742)
AR(2) p-value	0.908	0.879	0.878	0.694	0.646	0.673
Hansen p-value	0.861	0.876	0.489	0.891	0.850	0.413
Observations	498	480	457	498	480	457
Number of countries	98	98	98	98	98	98
Period	[1971-2015]	[1981-2015]	[1986-2015]	[1971-2015]	[1981-2015]	[1986-2015]

Note: This table reports the estimation results of model (1), taking into consideration the inverted U-shaped relationship between financial structure and economic growth. The dependent variable is real GDP per capita growth rate. FS_activity is the activity of stock market relative to the activity of financial intermediaries. The set of control variables includes time fixed effects, the lag of dependent variable, initial GDP per capita, the log of general government final consumption expenditure over GDP, the log of trade openness, the log of average years of schooling, and the log of inflation rate. Robust standard errors are in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively

Table 6 reports the results of the Lind-Mehlum test for the inverted U-shape relationship between financial structure and economic growth found in Table 5. The result shows that the lower and upper bond slopes of the two financial structure activity variables are positive and negative significant respectively. The null hypothesis of U-shape is rejected at conventional levels. Overall, the result confirms that the marginal effect of financial structure activity is positive up to a certain point and negative thereafter.

Table 6
Lind–Mehlum test for an inverted U-shape.

	(1)	(2)	(3)	(4)	(5)	(6)
Extreme point	0.25	0.28	0.27	0.24	0.26	0.27
Slope at L_{min}	4.392	4.455	4.851	4.846	4.835	4.883
p>|t|	0.000	0.000	0.000	0.000	0.000	0.000
Slope at L_{max}	-2.592	-2.452	-2.755	-2.878	-2.755	-2.739
p>|t|	0.002	0.051	0.044	0.048	0.052	0.064
SLM test for inverse U-shape	1.750	1.640	1.710	1.670	1.630	1.530
p>|t|	0.040	0.051	0.044	0.048	0.052	0.064
Filler 90% confidence interval	[0.025; 0.892]	[0.060; 0.995]	[0.050; 0.926]	[0.048; 0.955]	[0.055; 0.997]	[0.035; 1.128]
Period	[1971-2015]	[1981-2015]	[1986-2015]	[1971-2015]	[1981-2015]	[1986-2015]

Note: This table reports the results of the Lind-Mehlum test for an inverted U-shaped relationship between financial structure and economic growth.

Third, we check the sensitivity of our results for the period from 1976 to 2015 and 1981 to 2015. Due to the lack of data availability on financial structure efficiency, we focus on financial structure size and activity only. The result shows that only the financial structure in terms of activity affects economic development while the financial structure in terms of size does not. Different time frames do not affect our conclusion on the relationship between the financial structure and economic growth (full regression results are available upon request).

Fourth, we check whether the effects of financial structure on economic growth are different between country groups. Rioja and Valev (2004a), Rousseau and Wachtel (2011) indicate that financial development affects economic growth differently across country groups. Samargandi, Fidrmuc, and Ghosh (2015) argue that including all countries with different economic development levels can lead to biased results if the finance-growth relationship of one country group dominates the overall result. Pinno and Serletis (2007) find evidence that developing countries benefit from bank-based financial system while developed ones profit from market-based financial system. Thus, we divide our sample into two country groups: 47 high-income and 52 middle- and low-income countries based on the World Bank's classification of income level. Table 7's Panel A shows that the coefficients of financial structure, in terms of size and activity, are positive and statsitcally significant.

In contrast, Panel B shows that the financial structure, in terms of activity and efficiency, are positive and statistically significant. It means that in high-income countries, financial structure in terms in terms of size and activity are associated with economic development while in middle- and low-income countries, financial structure in terms of activity and efficiency are associated with economic development. Our result confirms that financial structure affects economic growth differently based on income level country groups.

Table 7
Effect of financial structure on economic growth – High income vs. Middle- and low-income.
Panel A – High-income countries

	(1)	(2)	(3)	(4)	(5)	(6)
	Levine 2002			Cuadro-Sáez & García-Herrero 2008		
FS_size	0.410**			1.740**		
	(0.204)			(0.881)		
FS_activity		0.502**			1.023*	
		(0.202)			(0.602)	
FS_efficiency			0.191			0.777
			(0.222)			(0.775)
AR(2) p-value	0.531	0.524	0.320	0.834	0.486	0.315
Hansen p-value	1.000	1.000	0.400	1.000	1.000	0.511
Observations	265	265	173	265	265	173
Number of countries	47	47	47	47	47	47

Panel B – Middle- and low-income countries

	(1)	(2)	(3)	(4)	(5)	(6)
	Levine 2002			Cuadro-Sáez & García-Herrero 2008		
FS_size	0.040			0.517		
	(0.310)			(0.811)		
FS_activity		0.367*			1.663**	
		(0.212)			(0.724)	
FS_efficiency			0.542*			1.366*
			(0.283)			(0.811)
AR(2) p-value	0.793	0.438	0.977	0.916	0.385	0.968
Hansen p-value	1.000	1.000	0.538	1.000	0.989	0.600
Observations	238	233	172	238	233	172
Number of countries	52	51	50	52	51	50

Note: This table reports the estimation results of model (1), taking into consideration the heterogeneous effects between high-income and middle- and low-income countries. The dependent variable is real GDP per capita growth rate. FS_size, FS_activity, and FS_efficiency are the size, activity, efficiency of stock market relative to the size, activity, and efficiency of financial intermediaries. The set of control variables includes time fixed effects, the lag of dependent variable, initial GDP per capita, the log of general government final consumption expenditure over GDP, the log of trade openness, the log of average years of schooling, and the log of inflation rate. Robust standard errors are in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively

Last, to examine if our results are sensitivity to the exclusion of major countries, we drop countries with highly developed financial system, including the United States, the United Kingdom, Germany, and Japan and re-estimate all models. Dropping four major countries does not significantly change our main results (full regression results are available upon request).

5. Conclusion

This paper re-examines the effect of financial structure on economic growth. We use a variety of financial structure indicators and macro-economic variables to examine the relationship between financial structure and economic growth under unbalanced financial system, economic volatility, banking crisis, and financial development level. We apply the system GMM estimation for a panel data set of 99 countries over the period 1971-2015.

The main findings can be summarized as follows. First, a more market-based financial system, in terms of activity and efficiency, helps country to grow faster while a more market-based financial system in terms of size does not. Second, although banking crises and macro-economic volatility negatively affect economic growth, they do not affect the relationship between the financial structure and economic growth. Third, the role of stock market over banks strengthens with the development of financial sector. Fourth, although the results obtained are in favor of market-based view, the dominating role of stock markets over banks is deteriorated if the financial structure is unbalanced toward stock market. In other words, in a country with under-developed banks but well-developed stock markets, increase the development of the stock markets relative to banks do not significantly

promote economic growth. Our results are robust to country groups, alternative model specifications, and other proxies for financial structure.

Our results indicate that a more developed toward stock market financial system is definitely not always better for economic growth. Understanding the relationship between financial structure and economic growth in different economic and financial system conditions is very important to guarantee the effective role of financial sector in boosting economic activities. In the case of under-developed banking system, increasing the financial development toward stock market is harmful for economic growth. The policymaker should focus on the strategies to balance financial structure to maintaining the positive long-run economic growth. Our result also urges for future research that identifies the mechanisms though which the marginal effect of financial structure on economic growth changes from positive to negative.

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Appendix

Table A

Financial variables definition and original data sources.

Variable	Definition	Original data sources
Stock market capitalization to GDP (%)	Value of listed shares to GDP	World Federation of Exchanges; Global Stock Markets Factbook and supplemental S&P data, Standard & Poor's
Deposit money banks' assets to GDP (%)	Claims on domestic real nonfinancial sector by deposit money banks as a share of GDP	International Financial Statistics, International Monetary Fund
Stock market turnover ratio (%)	Ratio of the value of total shares traded to average real market capitalization	World Federation of Exchanges; Global Stock Markets Factbook and supplemental S&P data, Standard & Poor's
Private credit by deposit money banks and other financial institutions to GDP (%)	Private credit by deposit money banks and other financial institutions to GDP	International Financial Statistics, International Monetary Fund
Bank overhead costs to total assets (%)	Ratio of bank's overhead costs over total assets	Bankscope, Bureau van Dijk
Stock market total value traded to GDP (%)	Total value of all traded shares in a stock market exchange as a percentage of GDP	World Federation of Exchanges; Global Stock Markets Factbook and supplemental S&P data, Standard & Poor's
Private credit by deposit money banks to GDP (%)	Private credit by deposit money banks and other financial institutions to GDP	International Financial Statistics, International Monetary Fund

Table B

Data descriptives.

Variable	Obs.	Mean	Std. Dev.	Min	Max
GDP per capita growth (%)	1135	1.870	3.492	-21.621	30.725
Stock market capitalization to GDP (%)	594	41.694	46.083	0.232	363.904
Deposit money banks' assets to GDP (%)	1127	46.241	41.607	0.003	474.128
Stock market turnover ratio (%)	587	41.274	56.694	0.062	541.459
Private credit by deposit money banks and other financial institutions to GDP (%)	1126	38.161	39.022	0.008	570.577
Bank overhead costs to total assets (%)	553	4.009	3.125	0.244	29.264
Stock market total value traded to GDP (%)	609	20.934	46.457	0.000	617.892
Private credit by deposit money banks to GDP (%)	1128	40.855	41.420	0.012	570.577
General government consumption expenditure to GDP (%)	1108	15.750	5.855	3.688	56.400
Trade openness	1134	78.252	51.805	0.198	422.085
Average years of schooling	1278	5.939	3.244	0	13.420
Banking crisis dummy variable	1260	0.143	0.350	0	1
Macro-economic volatility dummy variable	1129	0.120	0.326	0	1