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The Evolving Importance of Banks and Securities Markets

Asli Demirguc-Kunt
Erik Feyen
Ross Levine

The World Bank
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Abstract

This paper examines the evolving importance of banks and securities markets during the process of economic development. As economies develop, they increase their demand for the services provided by securities markets relative to those provided by banks, such that securities markets become increasingly important for future economic development. Some exploratory evidence further suggests that deviations of a country's actual financial structure—the mixture of banks and markets operating in an economy—from the estimated optimal structure are associated with lower levels of economic activity.

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The author may be contacted at ademirguckunt@worldbank.org.

The Evolving Importance of Banks and Securities Markets

Asli Demirguc-Kunt, Erik Feyen, and Ross Levine[1]

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Research finds that *both* the operation of banks and the functioning of securities markets influence economic development (Demirguc-Kunt and Maksimovic, 1998; Levine and Zervos, 1998), suggesting that banks provide different services to the economy from those provided by securities markets. For example, Acemoglu and Zilibotti (1997), Allen and Gale (1997, 1999), Boot and Thakor (1997, 2000), Dewatripont and Maskin (1995), Holmstrom and Tirole (1993), and Rajan (1992) argue that banks have a comparative advantage in reducing the market frictions associated with financing standardized, shorter-run, lower-risk, well-collateralized endeavors, while decentralized markets are relatively more effective in custom-designing arrangements to finance more novel, longer-run, higher-risk projects that rely more on intangible inputs.

Economic theory also emphasizes the importance of financial structure—the *mixture* of financial institutions and markets operating in an economy.[1] For example, Allen and Gale's (2000) theory of financial structure and their comparative analyses of Germany, Japan, the United Kingdom, and the United States suggest that (1) banks and markets provide different financial services; (2) economies at different stages of economic development require different mixtures of these financial services to operate effectively (Boyd and Smith, 1998); and (3) if an economy's actual mixture of banks and markets differs from the "optimal" structure, the financial system will not provide the appropriate blend of financial services, with deleterious effects on economic activity.

Empirical research, however, has been largely unsuccessful at clarifying the *evolving* importance of banks and markets during the process of economic development. Demirguc-Kunt and Levine (2001) show that banks and securities markets tend to become more developed as economies grow and that securities markets tend to develop more rapidly than banks. Thus, financial systems generally become more market-based during the process of economic development. But, this pattern could simply reflect supply side factors, such that securities markets grow more rapidly than banks as economies expand, with no implication that firms and households change their relative demand for the services provided by banks and markets respectively. Empirical research has not yet ascertained whether the relative demand for the types of financial services provided by banks and markets changes as economies grow, and

[1] See Allen and Gale (1995), Goldsmith (1969), Morck and Nakamura (1999), Morck, Yeung, and Yu (2000), Weinstein and Yafeh (1998), and citations in Allen and Gale (2000).

hence whether impediments to changes in the mixture of banks and markets hamper economic development (Beck and Levine, 2002; Demirguc-Kunt and Maksimovic, 2002; Levine, 2002).

In this paper, we evaluate empirically the changing importance of banks and securities markets as economies develop. In particular, we focus on assessing whether economies increase their demand for the types of services provided by securities markets relative to the services provided by banks as countries grow. We do this by testing whether the economic development "returns" to improvements to both bank and securities market development change as economies grow. At a more exploratory level, we also examine whether each level of economic development is associated with an "optimal" financial structure, such that deviations from this optimum are associated with lower levels of economic activity. We use data on 72 countries, over the period from 1980 through 2008, and we aggregate the data in 5-year averages (data permitting), so that we have a maximum of six observations per country. We use several measures of bank and securities market development, including standard indicators such as bank credit to the private sector as a share of gross domestic product (GDP), the value of stock market transactions relative to GDP, and the capitalization of equity and private domestic bond markets relative to GDP.

The primary methodological contribution of this paper is using quantile regressions to assess how the sensitivities of economic activity to both bank and securities market development evolve as countries grow (Koenker and Basset, 1978). Ordinary least squares (OLS) regressions provide information on the association between, for example, economic development and bank development for the "average" country, the country at the average level of economic development. But, quantile regressions provide information on the relationship between economic activity and bank development at each percentile of the distribution of economic development. Thus, we assess how the associations between economic development and both bank and securities market development change during the process of economic development.

Besides confirming that both banks and securities markets become larger relative to the size of the overall economy as countries grow, the paper's major findings are (1) the sensitivity of economic development to changes in bank development *decreases* with economic development, and (2) the sensitivity of economic development to changes in securities market

development *increases* as countries grow. Put differently, as economies develop, the marginal increase in economic activity associated with an increase in bank development falls, while the marginal boost to economic activity associated with an increase in securities market development rises. These results suggest that the demand for the services provided by securities markets increases relative to the demand for those provided by banks as economies develop.

We also conduct a preliminary examination of whether deviations of a country's actual financial structure from our estimate of the country's optimum are associated with lower levels of economic activity. To estimate the optimal mixture of banks and markets for each level of economic development, we first regress a measure of financial structure (such as the ratio of bank to securities market development) on GDP per capita for the sample of high-income OECD countries, while controlling for key institutional, geographic, and structural traits. The maintained hypothesis is that conditional on these traits, the high-income OECD countries provide information on how the optimal financial structure varies with economic development. We then use the coefficients from this regression to compute the estimated optimal financial structure for each country-year observation for all countries. Next, we compute the Financial structure gap, which equals the natural logarithm of the absolute value of the difference between the actual and the estimated optimal financial structure, controlling for systematic variation in the prediction errors. The Financial structure gap measures deviations of actual financial structure from the estimated optimum, where larger values indicate bigger deviations, regardless of whether the deviations arise because the country is "too" bank-based or "too" market-based.

We find that deviations of an economy's actual financial structure from its estimated optimum—i.e., increases in the Financial structure gap—are associated with a reduction in economic output. Even when controlling for bank development, securities market development, country characteristics, and country fixed effects, there is a negative relationship between the Financial structure gap and economic activity. Although we do not identify the causal impact of financial structure on economic development, these results are consistent with the view that the mixture of banks and markets—and not just the level of bank and market development—is important for understanding economic development.

This research is policy relevant. First, if the *mixture* of financial institutions and markets matters—and not only the development of financial institutions and markets, then this advertises financial structure as an independent indicator of the ability of the financial system to provide growth-enhancing services to the economy. Second, if the optimal mixture changes as an economy develops, then this advertises the costs of policy and institutional impediments to the evolution of the financial system. Third, this work suggests that the sensitivity of economic activity to bank and securities market development changes with economic development. This implies that the estimated OLS elasticities from past research of the impact of changes in bank or stock market development on economic development will yield misleading information about countries incomes far from the sample average income. Past studies do not account for the *evolving* importance of banks and markets during the process of economic development.

This paper builds on earlier studies of financial structure. Demirguc-Kunt and Levine (2001), for instance, find that financial structure is not robustly linked with economic growth. We do not reject this finding. Rather, we show that economies tend to increase their relative demand for the services provided by securities markets during the process of economic development and that *deviations* of actual financial structure from an economy's optimal financial structure—financial structure gaps—are associated with lower levels of economic activity. Thus, while earlier work focused on actual financial structure, we focus on the financial structure gap and stress the evolving importance of banks and markets.

This paper is one step in deriving a better understanding of the dynamic relationships among economic development, financial institutions, and securities markets. In this paper, we show that both the "supply" of securities market services and the economic development "returns" to securities market development increase as economies grow. This suggests that the relative demand for securities market services increases with economic development. But, we do not identify the causal impact of banks, markets, and financial structure on economic outcomes. Although this paper advertises the desirability of understanding the policy and institutional determinates of the Financial structure gap, much work remains.

1. Data and Summary Statistics

1.1 Financial system indicators

We use several measures of bank and stock market development to analyze the relationship between economic activity and the structure of the financial system. We would like to have indicators of the degree to which banks and markets ameliorate market frictions and thereby (1) improve ex ante information about possible investments, (2) enhance the monitoring of investments after financing occurs, (3) facilitate the trading, diversification, and management of risk, (4) ease the mobilization and pooling of savings, and (5) foster the exchange of goods, services, and financial claims. We would also like information on how the mixture of banks and markets affect the provision of these services. But, such empirical proxies do not exist for a broad cross-section of countries over the last few decades. Instead, we rely on standard measures of the size and activity of banks and securities markets. These measures are constructed over the period from 1980 to 2008, and Table 1 provides the primary sources of these indicators.

To measure "bank" development, we use **Private credit**, which equals deposit money bank credit to the private sector as a share of gross domestic product (GDP). Private credit isolates credit issued to the private sector and therefore excludes credit issued to governments, government agencies, and public enterprises. Private credit also excludes credits issued by central banks. Not surprisingly, there is enormous cross-country variation in Private credit. For example, averaging over the 1980-2008 period, Private credit was less than 10% of GDP in Angola, Cambodia, and Yemen, while it was greater than 85% of GDP in Austria, China, and United Kingdom. Table 2 indicates that the annual average value of Private credit across countries was 39% with a standard deviation of 36%.

To measure "market" development, we primarily use **Stock value traded**, which equals the value of stock market transactions as a share of GDP. This market development indicator incorporates information on the size *and* activity of the stock market, not simply on the value of listed shares. Earlier work by Levine and Zervos (1998) indicates that the trading of ownership claims on firms in an economy is closely tied to the rate of economic development. There is substantial variation across counties. As shown in Table 2, while the mean value of Stock value traded is about 29 percent of GDP the standard deviation is about double this value. In Armenia,

Tanzania, and Uruguay, Stock value traded annually averaged less than 0.23% over the 1980-2008 sample (10^{th} percentile). In contrast, Stock value traded averaged over 75%% in Hong Kong SAR, China; Saudi Arabia; Switzerland; and Unites States (90^{th} percentile).Also, we confirm this paper's results using other market development indicators. In particular, we examine **Stock market capitalization**, which simply measures the value of listed shares on a country's stock exchanges as a share of GDP and **Securities market capitalization**, which equals the capitalization of the stock market plus the capitalization of the private domestic bond markets, divided by GDP.

To measure the mixture of banks and markets operating in an economy, we use the **Financial structure ratio**, which equals Private credit divided by Stock value traded. The goal is to gauge the degree to which the financial system is relatively bank-based or market-based. Financial structure differs markedly across economies. As shown in Table 2, the annual average value of the Financial structure ratio is 279, ranging from 2.35 (10^{th} percentile) in Australia, India, Singapore, and Sweden to over 356 (90^{th} percentile) in Bolivia, Bulgaria, Serbia, and Uganda over the 1980-2008 sample period.

We also construct a measure of the **Financial structure gap**, which equals the natural logarithm of the absolute value of the difference between the actual Financial structure ratio and the estimated "expected" (or estimated "optimal") financial structure ratio. We describe the estimation of the expected financial structure ratio below. The Financial structure gap is designed such that it becomes larger when a country's Financial structure ratio deviates from the estimated expected ratio, regardless of whether the country becomes "too" bank-based or "too" market-based relative to the estimated optimal structure for an economy at that level of economic development. The Financial structure gap is computed for each country in each year. As reported in Table 2, there is enormous cross-country variation of the Financial structure gap (averaged over the sample period).

The financial structure gap measures the degree to which an economy's mixture of bank and market development deviates from our expected mixture, but it does not measure whether the financial system too "bank-based" or too "market-based" relative to the estimated mixture. Consequently, we also examine the degree to which a financial system is more bank-based or

market-based relative to our estimated financial structure for each economy. Tables 1, 2, and 3 provide information on the **actual Financial structure ratio / Optimal financial structure ratio**, where we discuss the construction of the Optimal financial structure ratio below. This variable indicates that the average financial structure of countries such as Guatemala, Namibia, and United Arab Emirates are highly distorted relative to their estimated optimum in that they are too bank-based (>4.91; 90^{th} percentile), while the financial structure of countries such as Denmark, Japan, and United Kingdom, are highly distorted relative to their estimated optimum in that they are too market-based (<0.03; 10^{th} percentile). Appendix 1 contains a list of countries and provides an overview of the period medians for GDP per capita, Private credit, Stock Value Traded, the Financial structure ratio, and the Financial structure ratio / Expected-Optimal financial structure.

1.2 Other data

As a measure of economic activity, we use **Log Real GDP per capita**, which equals the logarithm of GDP per capita in constant 2000 U.S. dollars. And, to assess the independent link between finance and economic development, we control for many other country characteristics that have been employed in the development literature. In some specifications, we use "standard controls" to evaluate the independent relationship between finance and economic activity. These standard controls include: years of schooling, openness to trade, inflation, government size, the initial GDP per capita of the economy in 1980, and dummy variables for the 5-year periods of analysis. Table 1 provides the specific definitions. In other specifications, we use "exogenous controls," which include dummy variables for the legal origin of the country along with the country's distance from the equator. Table 1 gives the detailed definitions and sources of these data and Table 2 provides descriptive statistics

1.3 Correlations

The correlations in Table 3 highlight key features about the financial system and economic development. First, bank and securities market development are positively correlated with economic development. Second, bank and securities market development are positively correlated, suggesting that financial development involves both bigger banks and bigger markets. Third, the Financial structure gap is negatively correlated with bank and securities development,

as well as with economic development. Though simple correlations, we will see that these basic patterns hold when controlling for many other national traits.

2. The Relationships among Banks, Markets, and Economic Development

2.1 Quantile regressions

To assess how the relationships between economic activity and both bank development and stock market development evolve with economic development, we use quantile regressions with data averaged over non-overlapping 5-year periods. Ordinary least squares (OLS) provide information on the relationship between Log Real GDP per capita and financial development for the country at the average level of economic development. But, OLS does not provide information on how the relationship between economic activity and financial development differs for countries at different levels of economic activity.

Quantile regressions model the relation between Log Real GDP per capita and financial development at the specific percentiles (or quantiles) of Log Real GDP per capita. Thus, in a quantile regression of Log Real GDP per capita on Private credit, the procedure is able to yield a *different* estimated coefficient on Private credit for each percentile (or quantile) of Log Real GDP per capita. For example, the estimated coefficient at the 50^{th} percentile is a median regression, yielding the estimated relationship between Log Real GDP per capita and Private credit at the median level of economic activity. By computing the quantile regression for each of the 5^{th} to the 95^{th} quantiles, we assess how the relationship between economic activity and financial development differs across distinct levels of Log Real GDP per capita.

In neither the OLS nor the quanitle regressions do we identify the causal impact of bank and securities market development on economic development. Rather, the goal here is to explore whether, and how, the relation between changes in economic activity and changes in both bank and market development varies with the level of economic development.

2.2 Illustrating the quantile regression results

In Figure 1-Panel A, the graph on the upper-left-hand-side plots the coefficients from quantile regressions for each of the 5^{th} to 95^{th} percentiles of Log Real GDP per capita, where the dependent variable is Log Real GDP per capita and the main regressor is Private credit and we

also control for Stock value traded. A circle indicates each coefficient estimate. The left axis provides information on the values of the coefficient estimates. Thus, the estimated coefficient, indicated by a circle, depicts the "sensitivity" of Log Real GDP per capita associated with a change in Private credit at each percentile of economic development. The graph also plots the actual value of Private credit at each percentile. A triangle indicates these actual values, where the scale is provided on the right axis. The triangles provide the average "quantity" of Private credit at each percentile of economic development. The graphs in the lower part of Figure 1 provide similar information on the relationship between economic activity and Stock value traded. The lower-hand-side charts confirm the increasingly relevant role for securities markets by documenting similar upward trends for both Securities market capitalization and Stock market capitalization.

Panel B of Figure 1 provides the same types of quantile analyses, while controlling for other characteristics of the national economies. We use "standard controls:" Log Real GDP per capita in 1980, Government size, Openness to trade, Inflation, Average years of schooling, and period-fixed effects.

In each of the eight graphs in Panels A and B of Figure 1, we provide two additional pieces of information. First, the horizontal dotted line is the OLS estimate of the coefficient on the financial development indicator. Thus, in the graph on the upper-left-hand-side of Figure 1-Panel A, the horizontal dashed line is simply the coefficient on Private credit from an OLS regression of Log Real GDP per capita on Private credit for the full sample of country-year observations. Second, the solid line shows the estimated linear relationship between each estimated coefficient of the financial development indicator and the GDP per capita percentile associated with the coefficient. As a specific example, consider the graph in the upper-right quadrant of Figure 1-Panel B. We first collect the estimated coefficients on Stock value traded after conditioning on the standard controls and period-fixed effects. We then regress these estimated coefficients on the GDP per capita percentile associated with the estimates. Table 4, column (4) provides the results from this regression. The estimated coefficient on GDP per capita percentile provides the trend line graphed in Figure 1.

2.3 Quantile results

In terms of bank development, Figure 1 shows that as Log Real GDP per capita rises, two things happen: (1) Private credit rises (triangles) and (2) the marginal increase in Log Real GDP per capita associated with an increase in Private credit *falls* (circles). Put differently, quantities rise and sensitivities fall. As reported in Table 4, this relationship is statistically significant: as economic increases, there is a significant reduction in the sensitivity of Log Real GDP per capital to an increase in Private credit.

The results are different for securities market development. As Log Real GDP per capita rises, (1) Stock value traded rises and (2) the marginal increase in Log Real GDP per capita associated with an increase in Stock value traded also *rises*. That is, quantities *and* sensitivities rise. Table 4 shows that this effect is statistically significant: the sensitivity of economic activity to Stock value traded increases as Log Real GDP per capita rises. These results suggest that the relationship between bank development and economic activity differs from that between securities market development and economic activity.

2.4 Broader implications of quantile analyses

The evidence is consistent with insights from Allen and Gale (2000) and Boyd and Smith (1998), who argue that economic development increases the demand for the services provided by securities markets relative to the services provided by banks, such that the optimal financial structure becomes more market-based at higher levels of economic development. As economies grow, both bank and stock market development increase, but the sensitivity of economic activity to changes in bank development falls while the sensitivity of economic activity to changes in market development increases. While one could argue that the "supply" of Private credit increases with economic development, reducing its marginal sensitivity with economic activity, the same argument cannot be made about Stock value traded, where the "supply" *and* "return" increase. Thus, the quantile regressions suggest both that the demand for the services provided by securities markets increases as countries develop and that the optimal financial structure changes—becoming more market-oriented—as economies develop.

These quantile regressions provide information on the evolving importance of banks and markets during the process of economic development. This evidence is inconsistent with the

view that economic development is simply associated with an increase in bank and stock market development with no effect on the relative demand of the services provided by these two components of the financial system. This evidence is also inconsistent with the view that banks and markets provide perfectly substitutable services to individuals and firms. Rather, the evidence suggests that the relative demand for the distinct services provided by securities markets increases with economic development.

3. The Financial Structure Gap

3.1 Computing the financial structure gap

While the quantile analyses are the major contribution of this paper, we provide additional information on the relationship between economic activity and the mixture of banks and markets in economies at different stages of economic development. We examine whether deviations of an economy's actual financial structure from its estimated "optimal" mixture of banks and markets are associated with less economic activity.

To accomplish this, we need to construct a measure of each economy's estimated "optimal" financial structure. This is challenging. Many factors influence the operation of banks, markets, and the mixture of banks and markets. Fortunately, existing research provides guidance on constructing an acceptable proxy of optimal financial structure (Rajan and Zingales, 1998). We do not need a perfect estimate of each country's optimal financial structure in each year. Rather, we require that the country-year estimates are positively correlated with the true optimal financial structure and that our estimates are not systematically biased in such a manner that drives the results.

We proceed in four steps: First, we select benchmark countries that, arguably, have few impediments to their financial systems achieving an optimal financial structure. We use the high-income OECD countries from 1980 through 2008.[2] This approach is similar to that employed by Rajan and Zingales (1998), who use the United States (and other highly developed countries such as Canada) as a benchmark financial system.

[2] The OECD countries in this sample for which we have sufficient data are: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Korea, Rep., Netherlands, New Zealand, Norway, Portugal, Slovak Republic, Spain, Sweden, Switzerland, United Kingdom, and United States.

Second, for these benchmark countries, we regress the Financial structure ratio on key national traits that might affect each country's optimal financial structure. Table 5 provides the results for our core analyses. We use six regressors. First and foremost, Real GDP capita captures the insights mentioned above that the optimal mixture of banks and markets changes as economies develop. We also include dummy variables for the legal origin of the country (English, French, Scandinavian, with German as the omitted category). Considerable research suggests that the common law is more conducive to securities market development (La Porta et al., 1998), suggesting that the optimal financial structure of such countries will be more market-based. Further, to condition on the geographic characteristics and the economic structure of the countries, we control for the country's distance to the equator, population size and density, along with the role of natural resources in the economy as discussed in Beck (2010) and Haber and Menaldo (2011a, b). The major finding from this second stage of the process is that the estimated Financial structure ratio falls—financial systems become more market-based—as economies grow (Table 5-Panel A).

Third, we compute the estimated financial structure for each country-year observation using the parameter estimates from the benchmark regression in Table 5. That is, for each country-year observation, including both OECD and non-OECD countries, we compute the projected financial structure and call this the expected financial structure—or the estimated optimal financial structure—since it is based on the parameter estimates from the high-income OECD countries. Besides this core measure of the estimated financial structure, we also construct an estimate of financial structure based on a version of the Table 5 regression that excludes Log Real GDP per capita for a robustness check.

Fourth, we compute the Financial structure gap for every country-year observation as the logarithm of the absolute value of actual financial structure minus the estimated optimal financial structure, standardizing by the prediction error, i.e.,

> Financial structure gap = Ln(| [financial structure – estimated financial structure] | / prediction error).

Intuitively, the prediction error is the sum of the variance of the error term in the high-income OECD benchmark regression and the uncertainty of the parameter estimation. While the former

is constant across countries, the latter increases for countries which are more distant from the high-income OECD sample in terms of their independent variables.[3] As a result, out-of-sample countries might exhibit higher Financial structure gaps by construction which can lead to spurious results. We therefore standardize the absolute value of the financial structure deviation by the prediction error because we were concerned that countries that the high-income OECD countries might be relatively weak benchmarks for much poorer countries. If this is the case, the estimated financial structure will be measured poorly, yielding a large estimated gap. Thus, we normalize to reduce this potential bias. For similar reasons, we also conduct the analyses omitting Log Real GDP from the variables used to construct the estimated financial structure ratio, obtaining similar results as we show below.

The Financial structure gap is our estimate of deviations of financial structure from the estimated or optimal level for a country at a particular stage of economic development. The Financial structure gap can potentially take on values between negative and positive infinity, where smaller values signify smaller deviations of actual financial structure from the estimated optimum. While the Financial structure gap is clearly measured with error, there seems little reason for believing that these errors bias the results in a particular manner. Table 5-Panel B provides descriptive statistics on the Financial structure gap for different groups of countries. The average Financial structure gap is smallest among the OECD countries, largest for the group of low-income economies, and the group of high-income, non-OECD countries falls in the middle.

3.2 Relationship between the financial structure gap and economic development

Figure 2 presents the estimated coefficients from quantile regressions of Log Real GDP per capita on the Financial structure gap. We again graph the coefficients from the 5th through the 95th percentile of Log Real GDP per capita. We provide results both from quantile regressions without controls and from quantile analyses using the "standard controls" defined above.

[3] The true structure ratio y^0 we estimate for a particular country-year in the (out-of-sample) non-high-income OECD sample is: $y^0 = x^0\beta + \varepsilon^0$, where x^0 represents the vector of independent variables associated with the out-of-sample observation. Our estimate, based on the high-income OECD countries regression, is:$\hat{y}^0 = x^0 b$. Therefore, the variance of the prediction error is: $Var[e^0|X, x^0] = \sigma^2(1 + x^{0\prime}[(X'X)^{-1}]x^0)$.

There are two noteworthy results. First, the estimated coefficients are negative for each Log Real GDP per capita percentile. That is, an increase in the Financial structure gap is associated with a reduction in economic activity at each level of Log Real GDP per capita. Second, the reduction in economic activity associated with an increase in the Financial structure gap diminishes at higher levels of Log Real GDP per capita. The upwards sloping linear fit of the estimated coefficients formally confirms that the sensitivity of output to marginal increases in deviation of financial structure from the estimated optimum is largest in lower income economies.

Next, we examine the relationship between Log Real GDP per capita and financial structure gap while also conditioning on the level of bank and securities market development. Table 6 presents panel OLS regressions for 5-year non-overlapping periods over the period 1980-2008 of Log Real GDP per capita on the Financial structure gap, Private credit, and Stock value traded, while controlling for several country characteristics and adjusting the errors for country clustering. Specifically, we control for country fixed effects in all of the regressions; thus, we control for all time-invariant national characteristics. Regressions 3 and 4 also control for period-fixed effects to account for common time-varying factors associated with economic activity in all countries such as the global cycle. Finally, we also add time-varying, nation-specific characteristics, i.e., the standard controls, in Regressions 3 and 4. Regression 4 differs from regression 3 in that we use a different measure of the financial structure gap in regression 4. Specifically, we use the measure the financial structure gap that excludes Log Real GDP from the equation used to constructed the estimated optimal financial structure ratio (in Table 5).

We find that Log Real GDP per capita is negatively associated with the Financial structure gap across all of the specifications in Table 6. The economic magnitude of the relationship between economic activity and the Financial structure gap is large. From columns (2) – (4), a one-standard deviation increase in the Financial structure gap (1.6) is associated with a drop in Log Real GDP per capita of 0.03 (=1.6*(-0.02)), i.e., a three percent reduction in economic activity.[4] While these results use Stock value traded as the main dependent variable, in

[4] We extend the analyses by assessing whether the nature of the Financial structure gap matters; that is, does it matter whether an economy is too bank-based or too market-based? Recall that the Financial structure gap measures is constructed to be larger when the deviations of actual financial structure from the estimated optimal structure are larger, regardless of whether actual financial structure is bigger or smaller than the estimated optimum. In

unreported regressions we confirm that they are qualitatively similar when Securities market capitalization and Stock market capitalization are used as dependent variables and the financial structure ratios are redefined accordingly.

4. Conclusions

This paper provides an empirical exploration of the evolving importance of banks and markets during the process of economic development. As economies grow, both the banking system and financial markets become more developed, but the sensitivity of economic output to bank development tends to fall while the sensitivity of economic output to securities market development tends to increase. These results suggest that the services provided by financial markets become comparatively more important as countries grow.

This paper's results are consistent with the view that (a) financial institutions provide different financial services from those provided by financial markets; (b) as economies grow, they require different mixtures of these financial services to operate efficiently, so that the optimal mixture of financial institutions and markets evolves, with an increasing relative role for markets; and (c) policies and institutions that impede an economy from optimally adapting its financial structure will hinder economic activity.

unreported tests, we also examined whether the sign of the deviation matters. We found that the direction of the deviation from the optimum did not matter and it is the Financial structure gap that matters, not whether the country is too bank- or too market-based.

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Table 1: Variable definitions and sources

Name	Source	Definition
Dependent variable and baseline financial sector controls		
Log Real GDP per capita	World Development Indicators (WDI)	Logarithm of real GDP per capita (constant 2000 USD).
Private credit	International Financial Statistics (IFS)	Deposit money bank credit to the private sector as % of GDP.
Stock value traded	Standard & Poor's	Value of stock market transactions as % of GDP.
Stock market capitalization	Standard & Poor's	The value of listed shares on a country's stock exchanges as a share of GDP as % of GDP.
Securities market capitalization	Standard & Poor's; Bank of International Settlements	Stock market capitalization plus Domestic private bond market capitalization as % of GDP.
Financial structure		
Financial structure ratio	Authors' calculations	Bank private credit / Stock value traded.
Expected financial structure ratio	Authors' calculations	The expected ratio is derived by regressing the Financial structure ratio on log real GDP per capita, legal origin, distance to the equator, population size and density, and natural resource as % of exports using OLS regression on annual OECD data.
Financial structure gap	Authors' calculations	Log absolute value of the difference between the expected and the actual Financial structure ratio. The residuals were first deflated by the prediction error.
Fin. structure ratio/Optimal fin. structure ratio	Authors' calculations	Actual Financial structure ratio / Expected Financial structure ratio
Standard controls		
Initial GDP per capita	WDI	Log Initial real GDP per capita (constant 2000 USD).
Avg. years of schooling	Barro and Lee (2010)	Log (1 + Average years of schooling).
Openness to trade	WDI	Log Sum ex- and imports of goods and services as % of GDP.
Government size	WDI	Log General government consumption as % of GDP.
Other controls		
Legal origin	Global Development Network Growth Database	Set of five dummy variables that refers to the legal origin of each country: British, French, Socialist, German and Scandinavian.
Distance from equator	Shleifer (2002)	Latitude.
Natural resources as % of total exports	WDI	Value of fuel exports plus ores and metals exports as a fraction of total merchandise exports.
Population size	WDI	Population size (millions).
Population density	WDI	Number of people per square km.

Table 2: Descriptive statistics

Descriptive statistics are calculated on all available annual data in the period 1980-2008.

Variable	Mean	Standard deviation	Maximum	Minimum
Dependent variable and baseline controls				
Log Real GDP per capita	7.58	1.57	10.94	4.13
Private credit	39.28	35.90	319.71	0.00
Stock value traded	28.80	57.44	632.34	0.00
Stock market capitalization	47.7	58.39	561.44	0.00
Securities market capitalization	59.08	71.19	588.27	0.00
Financial Structure				
Financial structure ratio	279.24	5,070.42	207,726.7	0.09
Expected financial structure ratio	53.81	37.00	127.82	-27.95
Financial structure gap	-1.41	1.59	7.63	-7.76
Fin. structure ratio/Optimal fin. structure ratio	3.52	57.33	2,111.86	-207.65
Standard controls				
Avg. years of schooling	6.18	2.99	13.08	0.03
Openness to trade	83.48	48.66	456.65	0.31
Government size	16.52	7.00	83.16	1.38
Controls				
Natural resources as a % of total exports	22.16	28.59	100	0.00
Distance from equator	0.28	0.19	0.72	0.00
Population size (mln.)	29.94	114.02	1,325.64	0.03
Population density (1,000 per square km)	252.39	1191.74	18,658.80	1.06

Table 3: Correlations

Correlations are calculated on all available annual data in the period 1980-2008. * indicates a significant correlation coefficient at the 5% level or better.

Panel A:

Correlations	Log Real GDP per capita	Private Credit	Stock value traded	Financial structure gap	Fin. Structure Ratio / Optimal Fin. Structure Ratio	Average years of schooling	Openness to trade	Inflation rate
Private Credit	0.67*	1						
Stock value traded	0.41*	0.51*	1					
Financial structure gap	-0.61*	-0.41*	-0.28*	1				
Fin. structure ratio / Optimal fin. structure ratio	-0.03	-0.01	-0.04	0.24*	1			
Average years of schooling	0.71*	0.52*	0.27*	-0.36*	0.01	1		
Openness to trade	0.27*	0.25*	0.14*	-0.00	0.00	0.25*	1	
Inflation rate	-0.06*	-0.05*	-0.04	-0.00	0.00	-0.00	-0.03*	1
Government size	0.22*	0.16*	0.04	-0.41*	-0.04*	0.25*	0.18*	-0.02

Table 3 (continued): Correlations

Correlations are calculated on all available annual data in the period 1980-2008. * indicates a significant correlation coefficient at the 5% level or better.

Panel B:

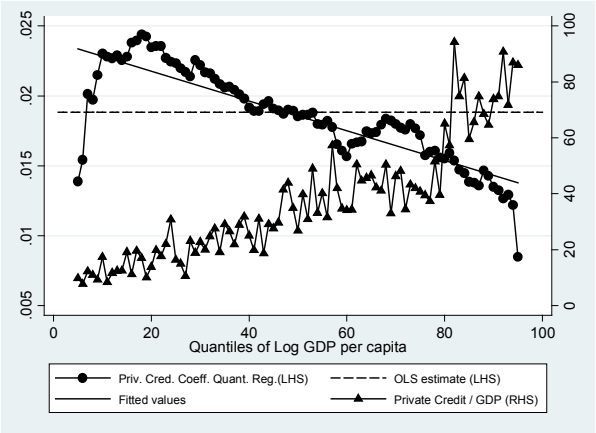
Correlations	Log Real GDP per capita	Private Credit	Stock value traded	Financial structure gap	Fin. Struct. Ratio / Optimal Fin. Struct. Ratio	Population size
Private Credit	0.67*	1				
Stock value traded	0.41*	0.51*	1			
Financial structure gap	-0.61*	-0.41*	-0.28*	1		
Fin. St. Ratio / Optimal Fin. St. Ratio	-0.03	-0.01	-0.04*	0.24*	1	
Population size	-0.07*	0.10*	0.08	0.12*	-0.02	1
Population density	0.19*	0.18*	0.28*	-0.06*	-0.01	-0.02

Figure 1: Quantile coefficients for Private credit and Securities Market Activity

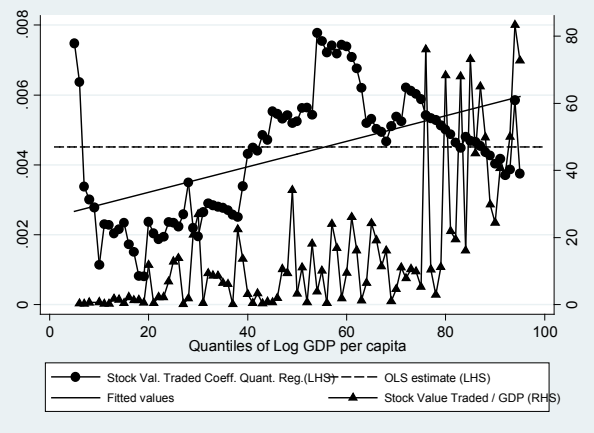
The dependent variable is Log real GDP per capita. The figures depict the coefficients of quantile regressions of Private credit, Stock value traded, Securities market capitalization and Stock market capitalization for each of the 5th to 95th percentiles of the GDP per capita distribution on the left axis. Private credit is defined as deposit money bank credit to the private sector as % of GDP. Stock value traded is the value of stock market transactions as % of GDP. Stock market capitalization is the value of listed shares on a country's stock exchanges as % of GDP. Securities market capitalization is defined as Stock market capitalization + Domestic private bond market capitalization as % of GDP. Percentile values are reported on the right axis. Data are 5-year non-overlapping country averages. Panel A does not control for additional variables. Panel B controls for Standard controls: Initial GDP per capita, Government size, Openness to trade, Inflation, Average years of schooling, and time-fixed effects. The horizontal dotted line depicts the OLS estimate. The solid lines represent linear fits.

Panel A: No controls

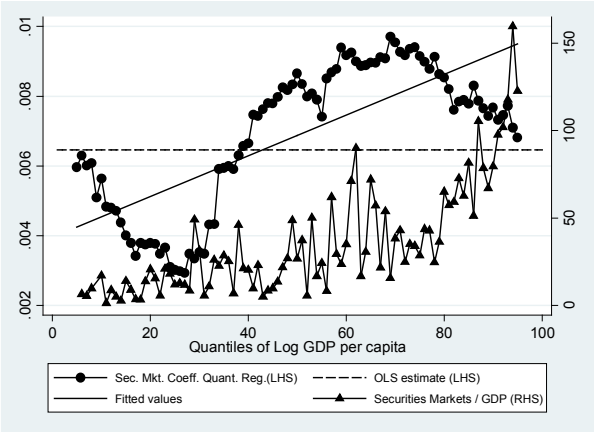
Private credit
(controlling for market value traded)



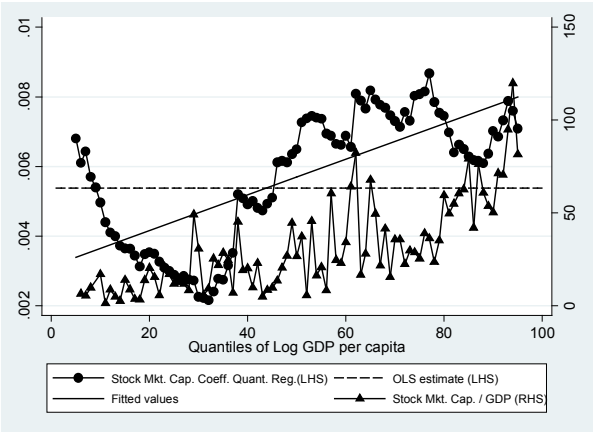
Stock value traded
(controlling for Private credit)



Securities market capitalization
(controlling for Private credit)

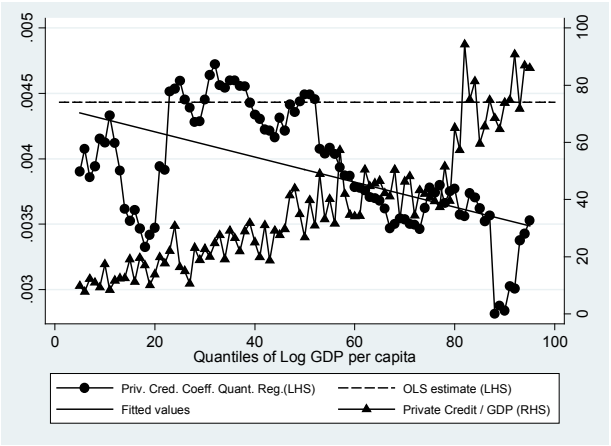


Stock market capitalization
(controlling for Private credit)

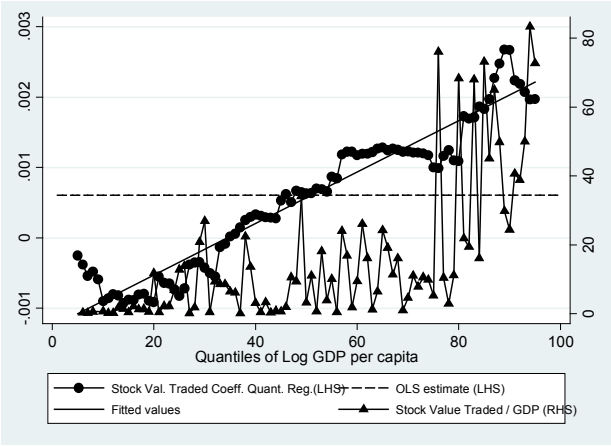


Panel B: Accounting for Standard Controls

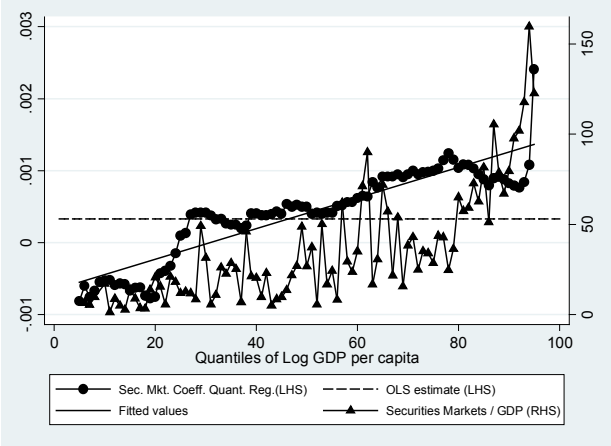
Private credit
(controlling for market value traded)



Stock value traded
(controlling for Private credit)



Securities market capitalization
(controlling for Private credit)



Stock market capitalization
(controlling for Private credit)

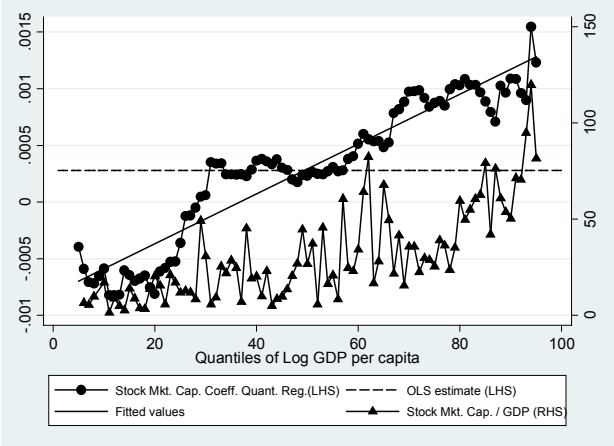


Table 4: Robust regression results of linear regression fits of Figure 1

The table displays robust regressions results of the linear fits in Panels A and B of Figure 1. The dependent variables are coefficients of quantile regressions of Private credit and Stock value traded for each of the 5th to 95th percentiles of the GDP per capita distribution, respectively, on 5-year non-overlapping country averages. The independent variables are a constant and the percentile associated with the coefficient. Columns 1 and 3 use coefficients of quantile regressions without additional controls (Panel A of Figure 1). Columns 2 and 4 use coefficients of quantile regressions that include standard controls: Initial GDP per capita in 1980, Government size, Openness to trade, Inflation, Average years of schooling, and time-fixed effects (Panel B of Figure 1). The p-values in brackets are based on robust country-level clustered standard errors. *, **, *** denote significance on the 10, 5, and 1-percent level, respectively.

	Dep. Var.: Percentile regression coefficient Private credit		*Dep. Var.: Percentile regression coefficient Stock Value Traded*	
	1 (No controls)	2 (With controls)	3 (No controls)	4 (With controls)
Percentile	-1.24E-04***	-1.02E-05***	4.18E-05***	3.79E-05***
	[0.00]	[0.00]	[0.00]	[0.00]
Constant	2.51E-02***	4.45E-03***	2.05E-03***	-1.34E-03***
	[0.00]	[0.00]	[0.00]	[0.00]
Standard controls	No	Yes	No	Yes
Observations	91	91	91	91

Table 5: Constructing the Financial Structure Ratio and Gap

Panel A shows regression results. The dependent variable is the financial structure ratio (the ratio of private credit to stock value traded). The financial structure gap is based on the expected relationship between the financial structure ratio and GDP per capita controlling for legal origin dummies, population size and density, distance to equator and exports of natural resources. This relationship is estimated on annual high-income OECD data using OLS regression. The expected ratios for non-OECD countries are estimated out-of-sample using the OECD model. The financial structure gap is defined as the log absolute value of the residual. The residuals were first corrected for the Standard Error of the prediction. Panel B reports the descriptive statistics. The p-values in brackets are based on robust country-level clustered standard errors. *, **, *** denote significance on the 10, 5, and 1-percent level, respectively.

Panel A: Financial Structure Ratio regression results (estimated on High-Income OECD sample)

Dep. Var.: Financial Structure Ratio	**OLS**
	1
Log GDP per capita	-26.64**
	[0.01]
English Legal Origin	7.27
	[0.69]
French Legal Origin	5.30
	[0.80]
German Legal Origin	27.24
	[0.22]
Distance to equator	46.45
	[0.44]
Log Population Size	-4.50
	[0.35]
Log Population Density	-0.91
	[0.86]
Natural Resources Exports	0.10
	[0.81]
Constant	254.23**
	[0.01]
Observations	493
R-squared (Root mean squared error)	0.05 (98.06)

Panel B: Descriptive statistics of the Financial Structure Gap

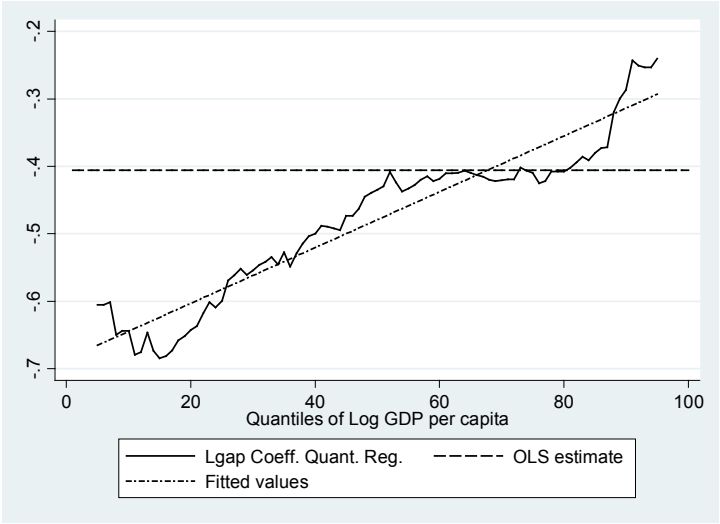
	Mean Financial Structure Gap (log absolute value of the residual)	**Mean Country Group Differences and 2-sided T-tests for Financial Structure Gap**	
	Linear fit, OLS		Linear fit, OLS
Low inc., non-OECD	-0.503	Low vs. high, non-OECD	0.618*
	(1.038)		[0.000]
High-inc., non-OECD	-1.121	Low, non-OECD vs. OECD	2.111*
	(1.431)		[0.000]
High-Income OECD	-2.614	High, non-OECD vs. OECD	1.493*
	(1.406)		[0.000]

Standard deviation in parentheses. P-value of t-tests in brackets. T-tests allows for unequal variance. * and ** denote significance at the 1 and 10-percent levels, respectively.

Figure 2: Quantile coefficients for the Financial Structure Gap

The figures depict the coefficients of quantile regressions of the financial structure gaps for each of the 5th to 95th percentiles of the GDP per capita distribution. Data are 5-year non-overlapping country averages. Panel A only controls for Private credit and Stock value traded. Panel B also accounts for a set of standard controls: Initial GDP per capita in 1980, Government size, Openness to trade, Inflation, Average years of schooling, and period-fixed effects. The financial structure gap is based on the expected relationship between the financial structure ratio (the ratio of Private credit to Stock value traded) and GDP per capita. In addition, the regression controls for legal origin dummies, population size and density, distance to equator and exports of natural resources. This relationship is estimated on annual high-income OECD data according to a linear fit using robust regression. The expected ratios for non-OECD countries are estimated out-of-sample using the OECD model. The financial structure gap is defined as the log absolute value of the residual. The horizontal dotted line depicts the OLS estimate. The finer-dotted lines represent linear fits.

Panel A: No controls



Panel B: Standard controls

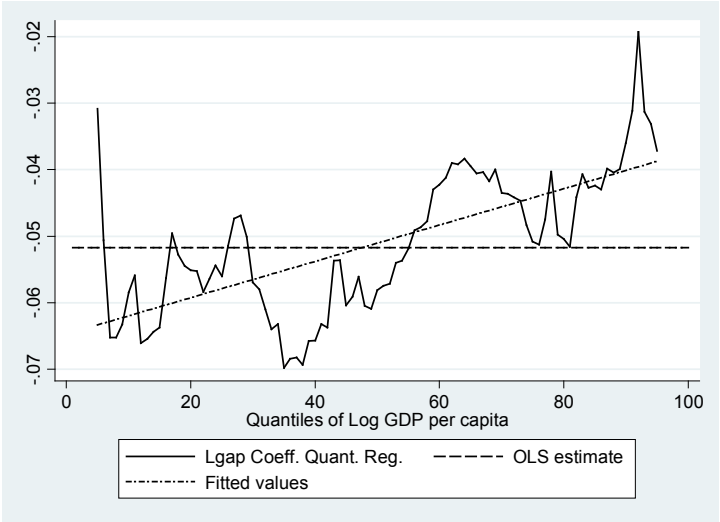


Table 6: Economic development and the Financial Structure Gap

OLS panel estimates. The dependent variable is Log Real GDP per capita. OECD high-income countries are excluded from the regression. Data are 5-year non-overlapping country averages. The main independent variable is the Financial structure gap defined as the log of the absolute difference between the actual and the expected financial structure ratio (Private credit to Stock value traded) deflated by the prediction error. The expected financial structure ratio used to construct the Financial structure gap in columns 1-3 is estimated on annual OECD high-income data with OLS using as controls log real GDP per capita, legal origin, population size and density, distance to equator and exports of natural resources. The expected ratio in column 4 is estimated on annual high-income OECD data with OLS using the same set of controls in columns 1-3, but excludes log real GDP per capita. Standard controls are Average years of schooling, Openness to trade, Annual inflation, Government size and period-fixed effects. The p-values in brackets are based on robust country-level clustered standard errors. *, **, *** denote significance on the 10, 5, and 1-percent level, respectively.

Dep. var.: Log real GDP per capita	1	2	3	4 *(excl. GDP per capita in fin. structure regression)*
Financial Structure Gap	-0.05***	-0.02**	-0.02***	-0.02**
	[0.00]	[0.02]	[0.01]	[0.01]
Private Credit	8.11***	4.44***	3.87***	3.96***
	[0.00]	[0.00]	[0.00]	[0.00]
Stock Value Traded	2.24**	0.18	-0.22	-0.26
	[0.03]	[0.78]	[0.70]	[0.63]
Standard controls	No	No	Yes	Yes
Country-fixed effects	Yes	Yes	Yes	Yes
Time-fixed effects	No	No	Yes	Yes
Observations	253	253	229	229
Adjusted R-squared	0.45	0.77	0.78	0.78
Countries	69	69	63	63

Appendix 1: Countries and medians for selected indicators

The table provides country medians for the period 1980-2008 of Private credit, Stock value traded, Financial structure ratio, and Actual Financial structure ratio / Estimated Optimal financial structure ratio.

Country	Median Real constant GDP per capita	Median Private credit (%)	Median Stock value traded (%)	Median Financial structure ratio	Median Fin. structure ratio/Optimal fin. structure ratio
Argentina	7,169	19.9	2.7	4.9	0.3
Armenia	683	7.4	0.0	232.4	2.9
Bangladesh	277	16.7	1.4	23.5	0.3
Bolivia	987	35.2	0.0	1,974.7	25.8
Botswana	2,595	14.7	0.7	20.0	0.4
Brazil	3,586	37.8	13.4	2.6	0.1
Bulgaria	1,564	41.7	0.8	27.4	0.3
Chile	3,917	55.8	8.8	7.3	0.2
China	600	93.0	29.5	3.5	0.0
Colombia	2,333	30.1	1.3	23.6	0.6
Costa Rica	3,549	19.0	0.2	105.9	2.8
Croatia	4,823	36.5	1.0	36.5	0.5
Côte d'Ivoire	635	20.0	0.2	105.6	0.7
Ecuador	1,335	21.0	0.3	66.5	1.1
Egypt, Arab Rep.	1,182	29.2	4.0	13.6	0.2
El Salvador	1,877	34.9	0.2	236.4	4.9
Georgia	1,075	7.8	0.2	63.7	0.8
Ghana	234	5.2	0.5	27.5	0.3
Guatemala	1,599	19.1	0.0	517.9	9.2
Hong Kong SAR, China	23,345	148.0	123.4	1.2	-0.1
India	352	25.9	38.5	0.8	0.0
Indonesia	773	24.7	7.1	3.4	0.1
Iran, Islamic Rep.	1,486	22.8	1.9	14.3	0.2
Israel	16,920	68.6	22.3	3.5	1.0
Jamaica	3,469	24.0	2.3	12.2	0.3
Jordan	1,901	66.0	10.4	6.0	0.1
Kazakhstan	1,397	21.2	0.7	24.9	0.3
Kenya	421	24.2	0.6	38.7	0.5
Kuwait	16,929	56.5	36.0	1.3	0.1
Kyrgyz Republic	321	5.3	1.6	3.1	0.0
Latvia	3,588	22.8	0.8	31.0	0.3
Lebanon	4,459	73.5	1.4	59.2	1.5

Appendix 1 (continued): Countries and medians for selected indicators

Country	Real constant GDP per capita	Private credit (%)	Stock value traded (%)	Financial structure ratio	Fin. structure ratio/Optimal fin. structure ratio
Lithuania	3,506	16.8	1.9	13.2	0.2
Macedonia, FYR	1,752	23.9	1.4	23.5	0.2
Malawi	144	8.9	0.3	19.7	0.2
Malaysia	3,366	105.7	43.7	2.5	0.1
Mexico	5,277	17.2	8.1	2.3	0.1
Moldova	512	13.3	1.9	11.7	0.1
Mongolia	464	11.1	0.3	51.9	0.5
Morocco	1,234	29.0	2.6	15.1	0.2
Namibia	2,052	46.6	0.3	209.3	4.0
Nepal	199	18.3	0.5	57.3	0.5
Nigeria	368	13.2	0.4	28.9	0.2
Oman	7,537	24.7	3.4	13.2	0.4
Pakistan	503	24.6	17.2	1.5	0.0
Panama	3,480	60.4	0.5	170.6	5.1
Papua New Guinea	630	18.1	0.1	171.2	2.4
Paraguay	1,399	20.1	0.1	296.1	4.2
Peru	2,049	13.3	2.9	7.5	0.2
Philippines	941	29.3	9.6	3.3	0.1
Poland	4,251	27.5	5.1	4.3	0.1
Romania	1,896	37.5	0.9	11.3	0.2
Russian Federation	2,037	16.2	7.8	1.7	0.0
Saudi Arabia	9,402	22.7	9.7	2.4	0.1
Singapore	18,451	90.0	74.0	1.4	-0.1
Slovenia	9,595	35.5	2.6	14.6	0.3
South Africa	3,181	58.0	43.4	1.4	0.0
Sri Lanka	676	21.8	1.8	14.3	0.2
Tanzania	264	5.4	0.1	63.9	0.7
Thailand	1,827	95.6	34.0	2.9	0.1
Tunisia	1,639	53.8	1.4	39.8	0.7
Turkey	3,580	17.8	30.3	0.7	0.0
Uganda	215	4.2	0.0	1,334.7	14.0
Ukraine	944	11.1	0.6	41.1	0.5
United Arab Emirates	22,586	47.4	1.1	46.8	27.0
Uruguay	6,068	35.3	0.0	2,730.4	87.8
Venezuela, RB	5,030	16.5	0.7	14.3	0.5
Vietnam	328	37.3	1.0	217.8	2.8
Zambia	369	8.2	0.2	37.7	0.3