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Financial Structures and Economic Outcomes: An Empirical Analysis

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Financial Structures and Economic Outcomes: An Empirical Analysis

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Abstract

This paper investigates the potential relationships between financial structures and economic outcomes. The empirical results that withstand a battery of methods suggest that some financial intermediation structures are likely to be more closely related to positive economic outcomes than others. For instance, protective financial buffers within institutions have been associated with better economic performance, and a domestic financial system that is dominated by some types of nontraditional bank intermediation or that has a high proportion of foreign banks has in some cases been associated with adverse economic outcomes, especially during the financial crisis. The results also suggest that there may be trade-offs between beneficial effects on growth and stability of some financial structures. For example, the positive association of financial buffers with growth can diminish above a certain, relatively high, threshold—a too-safe system may limit the available funds for credit and hence growth.

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I. INTRODUCTION

The global financial crisis has required policymakers to reconsider the role that the structure of their financial systems plays in achieving good economic outcomes. Going forward, a number of forces—including the crisis itself, ongoing adjustments by market participants, crisis management responses by authorities, and an evolving regulatory reform agenda—can be expected to change the structure of the financial intermediation in fundamental ways.

The aim of this paper is to assess how these expected changes in the financial structures across countries will interact with economic outcomes. We will use measurements of financial structure and relate them to four indicators of economic outcomes: (1) the growth of real GDP per capita (real growth); (2) the volatility of real growth (which implies periodic economic booms and busts); (3) financial stability (financial crises lead to economic and social dislocations); and (4) income inequality, as measured by the Gini coefficient.

Since the relationship between the *structure* of the financial sector and economic performance has not been as intensively studied as the degree of financial *development*, the overall empirical results of this paper should be viewed as suggestive. First, data available on structural characteristics are only available from the late 1990s, making long-term relationships difficult to verify. Second, the period over which the empirical work can be conducted contains a very severe financial crisis, suggesting that even with good estimation techniques the results should be interpreted cautiously. Third, the proxies for financial structure are just that—proxies of concepts—and the interpretation of the results needs to consider their representativeness. Despite these provisos, this paper fills an important gap given (1) the prominence of innovative structural features in the near collapse of the financial system following Lehman’s failure and (2) the prospect of further structural changes (whether intended or not) as regulatory and other policies seek to prevent a replay of that crisis and to improve economic performance by making the financial system safer (see Chapter 3 of the October 2012 Global Financial Stability Report).

A related question we seek to investigate is whether the structural changes occurring in the financial system are making it safer in a way that will promote better economic outcomes. Rather than on the role of financial depth and development, we focus on structural features—such as the extent of unregulated intermediation (banks vs. nonbanks), competition and concentration, and domestic and cross border interconnectedness. Which of those features matter? How should these features be shaped to produce higher real growth, lower volatility of real growth, and a more stable financial system? These are new questions that the literature has not taken up thoroughly before.

While the results are to be interpreted cautiously, the preliminary evidence from 1998 to 2010 across 58 countries suggests that, indeed, some structures of financial systems are likely to be more closely related to positive economic and financial stability outcomes than others. On the positive side, protective financial buffers within institutions have been associated with better economic performance. On the negative side, a domestic financial system that is dominated by some types of nontraditional bank intermediation or that has a high proportion

of foreign banks has in some cases been associated with adverse economic outcomes, especially during the financial crisis.

The results also suggest that there may be levels beyond which the beneficial effects on growth and stability of some financial structures diminish. For example, the positive association of financial buffers with growth can diminish above a certain, relatively high, threshold—a too-safe system may limit the available funds for credit and hence growth. Similarly, cross border connections through foreign banks are beneficial most of the time, but during a crisis may be associated with instability or limit their active participation in the local economy. Hence, we cannot say that specific characteristics of a financial structure will *always* be associated with better outcomes, since there are cases where these characteristics may in fact have detrimental effects.

The paper concludes with a few tentative recommendations for regulatory reform and other financial policies to deliver preferred outcomes. These include: (i) encouraging sufficient financial buffers (although not so high so as to inhibit their intermediation role); (ii) ensuring foreign banks can support healthy financial globalization through a robust cross border resolution framework and other arrangements to ensure that financial flows are less volatile; and (iii) ensuring a more concrete discussion of how concentration of banking system assets in just a few large banks might hold the economy hostage through large, expensive implicit government guarantees.

The paper proceeds as follows. Section II briefly reviews the literature on the relationship between financial structures and economic outcomes. Section III discusses data and methodology for the econometric work. Section IV summarizes the empirical results. Section V concludes with key lessons learned and policy implications.

II. LITERATURE REVIEW: THE RELATIONSHIP BETWEEN FINANCIAL STRUCTURES AND ECONOMIC OUTCOMES

A rich theoretical and empirical literature exists on the relationship between financial and economic outcomes. It has focused mostly on the relationship between financial development and growth, using proxies for the size of financial systems, and less on the effect of financial structures. Specifically:

A. Financial Development and Growth

There have long been two schools of thought with sharply differing perspectives on the potential importance of finance. On the one hand, economists such as Schumpeter (1911), Goldsmith (1969), McKinnon and Shaw (1973) saw financial intermediaries and markets as playing a key role in economic activity and growth. A battery of models articulates the mechanisms through which the financial system may affect long-run growth, stressing that financial markets enable small savers to pool funds, that these markets allocate investment to the highest return use, and that financial intermediaries partially overcome problems of adverse selection in credit markets. Empirically, researchers have shown that a range of financial indicators for size, depth, and functioning are robustly positively correlated with economic growth. For instance, Levine (2005) showed the deep and well-functioning

financial systems are associated with higher long-run growth. On the other hand, Robinson (1952) believed that the causality was reversed. Economies with good growth prospects develop institutions to provide the funds necessary to support those good prospects. In other words, in this view the economy leads, and finance follows. Lucas (1988) also dismissed the finance-economic growth relationship, stating that economists “badly over-stress” the role financial factors play in economic growth.

B. Financial Development and Growth Volatility

A large body of theoretical and empirical evidence suggests that larger and deeper financial systems help diversify risk and reduce the vulnerability of the economy to external shocks, thus smoothing output volatility. Easterly, Islam, and Stiglitz (2000) suggest that financial depth (as measured by private credit to GDP) reduces volatility up to a point, but too much private credit can increase volatility. Rancière, Tornell, and Westermann (2008) argue that countries with large financial sectors feature both higher growth and higher volatility. Moreover, Dabla-Norris and Narapong (2012) summarize the theoretical literature that outlines various mechanisms through which financial development can affect macroeconomic volatility. Aghion and others (1999) develop a theoretical model which combines financial market imperfections and unequal access to investment opportunities. They show that economies with poorly developed financial systems tend to be more volatile, as the demand for and supply of credit tends to be more cyclical. Empirically, Aghion and others (2010) find that deep financial systems can alleviate liquidity constraints on firms and facilitate long-term investment, reducing the volatility of investment and growth. In the same vein, Raddatz (2006) finds that sectors with larger liquidity needs in financially underdeveloped countries are more volatile and their economies experience deeper crises. Similarly, access to bank finance dampens output volatility at the industrial level due to countercyclical borrowing by financially constrained sectors (Larrain, 2006). Evidence at the household level suggests that access to financial services allows for greater risk smoothing (i.e., deviations of realized income from mean income). Dabla-Norris and Narapong (2012) also investigate the relationship between volatility and financial development in both advanced and developing economies.

C. Financial Structure and Growth

In considering the importance of financial structure for economic growth, economists have tended to focus on whether bank-based or market-based financial systems are more conducive to growth, with inconclusive results. Those who argue for the superiority of bank-based systems emphasize the advantages that banks and other intermediaries have in information acquisition and relationship formation (Grossman and Hart, 1980; Stiglitz, 1985; Bhidé, 1993; Allen and Gale, 2000). However, proponents of market-based systems argue that bank-based systems tend to include intermediaries with monopoly power, and that bank-based systems tend to be more conservative and less flexible in nature (see Rajan 1992). There are also those who argue that neither type is more effective than the other at promoting growth; what matters is the financial system’s overall level of development (see for example, Rajan and Zingales, 1998).

Empirically, there has been little resounding evidence in favor of either bank-based or market-based systems. Beck and Levine (2004), Demirgüç-Kunt and Maksimovic (2002), and Levine (2003) all suggest that financial structure does not play a decisive role in growth. Others, however, find that after controlling for the effect of overall financial development on growth, the structure of the financial system can still matter. When countries have inflexible judicial systems so that they are less able to adapt laws to changing economic conditions, the degree of bank-orientation is positively correlated with long-run economic growth (Ergungor, 2008).

Some in the literature have considered in some depth whether a competitive or monopolistic banking structure is better for promoting growth. Some authors find support for high levels of competition (Jayaratne and Strahan, 1996; Cetorelli and Strahan, 2006; World Bank 2007), whereas others find that a more oligopolistic system better promotes growth (Jackson and Thomas, 1995; Petersen and Rajan, 1995). As for financial stability, Allen and Gale (2004) argue that excessive risk taking is contained when banks enjoy monopoly power, while Boyd and De Nicolò (2005) argue that monopoly power lowers borrowing firms' profitability and incentivizes firms to take excessive risk, transferring subsequent losses to the banking system. Borrowing firm profitability may depend on industrial development stage. In early stages, firm profitability can be higher with larger investments of other firms (e.g., 19th century railroads, and more recently, the dot-com boom). In such cases, financial intermediaries compete, if allowed, to facilitate investments, resulting in higher growth and more stability (Ueda, 2012).

D. Financial Structure and Stability

There are two main dimensions of stability that matter: the volatility of economic growth and financial stability. Most research has been concerned with the volatility of economic growth; that is, the effect of financial structure on the occurrence of booms and recessions. Two papers analyze the role of the relative importance of equity and debt financing in macroeconomic volatility, with Denizer, Iyigun, and Owen (2000) finding that a higher share of equity financing leads to greater macroeconomic volatility, and Huizinga and Zhu (2006) reaching the opposite conclusion. There has been some research related to financial structure and financial stability. For instance, Rajan (2005) suggests that the increasing complexity of the modern financial system may create more financial-sector-induced procyclicality than in the past, and creates a greater probability of a catastrophic meltdown.

Some authors investigate the relationship between financial structure and financial stability. Barrell and others (2010a,b) and Kato and others (2010) expand existing work on early warning systems for banking crises to include buffer measures like capital and liquidity. They find that higher buffers have a marked negative effect on the probability of a banking crisis. Lund-Jensen (2012) finds that high levels of financial interconnectedness, proxied by non-core to core bank liabilities, have a positive significant impact on the probability of a systemic banking crisis. Additionally, the BCBS 2010 report on long-term economic impact of stronger capital and liquidity requirements studies how higher buffers may reduce the amplitude of normal business cycles. In another study, Rosengren (2012) finds that certain financial structures (taking the degree to which money market mutual funds and broker-

dealers are present in the financial system as measures of structure) can make the financial system vulnerable to stresses.

The aim of this paper differs from seemingly similar work done in IMF (2006), which focused on comparing the economic cycle dynamics associated with "arms-length" versus "relationship-based" financial systems. Still, IMF (2006) was influential regarding the choice of variables used in this paper. Also, IMF (2006) abstracts from the detailed financial and regulatory factors considered here.

In all, however, conclusions about the relationships between differing financial structures and economic outcomes have been tentative and largely inconclusive. This is an important gap, since the structure of financial intermediation across the globe is changing, especially during the last two decades. It is important to assess how these changes in financial structures may be associated with economic outcomes. If these changes in financial structures are associated with lower longer-term growth or increases in economic volatility, there may be a role for government policies to try and “tweak” the changes in financial structures to promote better economic outcomes.

The implications of certain structural features are assessed with our three measures of performance—the pace of real per capita growth, the volatility of real per capita growth, and financial stress.² As noted in Chapter 3 of the October 2012 GFSR, the desirable features of a financial system are thought to include one that is less complex and more transparent, better capitalized and features a more sustainable level of maturity mismatch. A safe system would be competitive but without encouraging excessive risk-taking or dependence on implicit government guarantees without paying for them. Finally, a system that allowed a healthy degree of risk diversification with well-managed institutions, both domestically and across borders would allow economies to benefit from financial globalization.

E. Financial Development and Income Inequality

Theory does not give clear guidance on whether financial development should increase or decrease income inequality. An argument that it may lower inequality is based on the idea that financial market imperfections, such as information asymmetries and transaction costs, may be more binding upon the poor. As a result, any financial development that relaxed those constraints would disproportionately benefit the poor (see Galor and Zeira (1993); Aghion and Bolton (1997); Galor and Moav (2004)). On the other hand, there is a literature arguing that because the poor typically rely on informal or family connections for capital, improvements in the formal financial sector disproportionately benefit the rich (see, for example, Greenwood and Jovanovic (1990)).

² For the formal definitions of these variables, see Annex 3.1 in Chapter 3 of the October 2012 Global Financial Stability Report. The financial stress index is a monthly indicator of national financial system strain. See Cardarelli, Elekdag, and Lall (2011) for advanced economies and Balakrishnan and others (2009) for emerging economies. The indicator is used here at an annual frequency.

The empirical evidence is less mixed, strongly suggesting that financial development leads to lower inequality. Examples of papers that support this result include Clarke et al (2006) and Beck, Demirgüç-Kunt and Levine (2007), which also provides a thorough summary of the literature. Townsend and Ueda (2006) and Nikoloski (2012) find an inverted U-curve relationship between financial sector development and inequality. One paper that argues in the other direction is Claessens and Perotti (2007), which focuses on institutional factors and argues that financial development can be accompanied by the erection of barriers to entry by insiders, and so can lead to unequal access to finance and contribute to inequality. In contrast to the literature on financial development, there is very little written on the relationship of specific aspects of financial structure and inequality, beyond direct measures of financial access. This working paper aims to contribute to the study of that relationship.

III. DATA AND METHODOLOGY

A. Data

The dependent variables, the independent variables related to financial structure measures, and “control” independent variables in the regressions are shown in Table 1. Further detail on the financial structure measures can be found in Table 2.

Table 1. List of Variables Used in Regression Analysis

List of dependent variables:		
Concept	Variable	Source
Output growth	Growth rate of real GDP per capita	IMF, World Economic Outlook database
Growth volatility	Standard deviation of real GDP per capita growth, computed on a backward looking five year rolling window.	IMF, World Economic Outlook database
Financial stress	Financial stress index covering banking, securities and foreign exchange markets.	IMF Research Department
Inequality	Gini coefficient.	World Income Inequality Database (Solt, 2009)
List of macroeconomic and institutional control variables:		
Concept	Variable	Source
Lagged output growth	Lagged growth rate of real GDP per capita.	IMF, World Economic Outlook database
Inflation	CPI inflation rate.	IMF, World Economic Outlook database
Government debt	Government debt to GDP ratio.	IMF, World Economic Outlook database
Government consumption	Government consumption to GDP ratio.	IMF, World Economic Outlook database
Trade openness	Sum of imports and exports to GDP ratio.	IMF, World Economic Outlook database
Institutional quality	Composite index of Individual Country Risk Guide.	The PRS Group, ICRG database
Output gap	Difference between Nominal GDP and Potential GDP relative to Potential GDP (scaled by 100).	IMF, World Economic Outlook database

Source: IMF staff.

Table 2. Indices, Subindices, and Data Sources

Index/Subindex	Data Source
Market-based Intermediation Index	
Non-traditional banking (subindex)	
Other earning assets to total assets ratio	IMF staff calculations based on Bankscope data
Other interest-bearing liabilities to total liabilities ratio	IMF staff calculations based on Bankscope data
Traditional Bank Based Intermediation Index	
Competition in banking (subindex)	
3 Bank asset concentration (in percent)	The World Bank, Global Financial Development Database
Systemic Risk Contributing Factors through Activity and Soundness Index	
Buffers (subindex)	
Liquid assets to deposits and short-term funding ratio	The World Bank, Global Financial Development Database
Equity to total assets ratio	The World Bank, Global Financial Development Database
Competition Index	
Concentration (subindex)	
3 Bank asset concentration (in percent)	The World Bank, Global Financial Development Database
Financial Globalization Index	
Share foreign banks in total number of banks	The World Bank, Global Financial Development Database
Total bank foreign assets to gross domestic product ratio	IMF, Balance of Payments Statistics; and WEO
Source: IMF staff.	

Note: WEO= World Economic Outlook.

Most of the variables related to financial structure and analyzed in Chapter 3 in the October 2012 GFSR were included in the regressions, but many of these variables were not consistently statistically significant. Insignificant variables included the ratios of noninterest income to total income, interbank assets to total assets, interbank liabilities to total liabilities, loans and bonds held by nonbanks to loans and bonds held by the financial sector, and loans and bonds held by banks to the overall financial sector. Net interest margin and the transparency (disclosure) of financial information had inconsistent results, which may be due to limitations in the data.

Our sample contains data for 58 economies during the 1998–2010 period in an unbalanced panel:

- *Advanced economies*: Australia, Austria, Belgium, Canada, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong SAR, Iceland, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Malta, the Netherlands, New Zealand, Norway, Portugal, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, the United Kingdom, and the United States
- *Emerging economies*: Brazil, Bulgaria, China, Colombia, Costa Rica, Croatia, Guyana, Hungary, India, Indonesia, Lithuania, Malaysia, Mexico, Moldova, Nicaragua, Peru, Philippines, Poland, Romania, Russia, South Africa, Suriname, Thailand, Turkey, and Ukraine

B. Econometric Methodology

Our interest is in the relationship between measures of financial structure and our set of dependent variables. Due to our relatively short sample period, we aim to use variation both across countries and over the length of our sample. Our short sample motivates the use of a country fixed effects specification as our primary specification (see below).³

A “baseline” regression relates our dependent variables outcomes to financial structures and a set of controls. In addition, we include an interaction term between the financial structure variable being examined and a crisis dummy indicating whether a given country is undergoing a banking crisis. The purpose is to explore the possible differences in their relationships between good times and crisis periods.

The baseline regression is then augmented to investigate the presence of nonlinearities in the relationship between financial structures and economic outcomes. We allow for these nonlinear effects by including a second-degree polynomial specification for the financial structure variables.

To determine whether the relationship between financial structures and economic outcomes differs depending on different levels of economic development, the analysis is also conducted separately for each group of economies. Also, to control for the level of development the GDP per capita level was introduced, but it did not gain significance, as the fixed effect likely captured this concept in the cross-section of countries. The relative lack of data constrains our ability to estimate and interpret the results. The key difficulties include:

- ***The short sample period.*** Data on the financial structures are only consistently available across a large enough sample of countries to perform meaningful empirical work since 1998. Hence, they are accompanied by a short, and relatively limited, set of macroeconomic circumstances. In particular, the period under study included a very severe financial crisis.
- ***Incomplete measures of financial structure.*** The analysis relies on proxies for the concepts of financial structure. For example, to measure the level of financial globalization, the paper uses a measure of foreign bank presence (share of foreign banks in total number of banks) and a measure of domestic bank presence overseas (the ratio of total bank foreign assets to GDP). These variables capture important elements of financial globalization, but only imperfectly as they are only measuring certain aspects of globalization from the perspective of the banking sector.
- ***Outliers.*** Some variables in certain countries exhibit large swings. As a robustness check, the regressions were re-run using a range of methods excluding these outliers.

³ Our short sample rules out using 5-year non-overlapping periods, a standard approach in the literature to controlling for the business cycle.

- ***Difficulties in assessing statistical significance.*** The initial analysis included a range of structural variables that show no statistically significant relationship (see Section IV). However, this should not necessarily be interpreted as the evidence of there being no relationship between these other measures and economic outcomes; instead, this statistically insignificant relationship may be the result of insufficient variation in the data to detect a statistical relationship. In the same vein, the results reported in the paper are the relationships for which the analysis has shown sufficient evidence.

The analysis, as in other similar econometric work on economic growth, also faces two main econometric challenges:

- ***Possibility of a catch-up effect.*** The difference in economic development level may affect econometric results. For instance, countries that start at a lower level of economic activity tend to grow faster than those which start at a higher level. There are also other country-specific factors that drive economic outcomes. Therefore, both GDP per capita and a country level fixed-effects panel specifications were employed separately.⁴ In addition, estimation is also done for advanced and emerging economies separately to broadly reflect the different level of economic development.
- ***Possibility of reverse causation and endogeneity:*** As indicated in the literature, it might be economic outcomes that drive financial structure, rather than the other way around. One approach that can mitigate this problem is the Generalized Method of Moments (GMM) approach proposed by Arellano-Bond (1991), Arellano-Bover (1995) and Blundell-Bond (1998).⁵ This method is employed in addition to the fixed effects model with a lagged dependent variable, and provides conclusions that are broadly similar. While the analysis attempts to correct for any reverse causality, the econometric results are presented conservatively as providing information about *associations* between financial structures and economic outcomes, rather than relying on a clear identification of *causal* relationships.

In attempting to deal with this range of issues, the discussion in the text only presents variables where the estimated coefficients remain statistically significant (or remain insignificant of the same sign) across various specifications that were used, as well as across time, and across countries (or within subsets of countries), and with or without outliers. The battery of techniques provides some reasonable confidence that the results are “robust” and reflect the variables’ association with economic outcomes. In this paper, we report results from the fixed effects regressions, GMM results are available from the authors upon request.

⁴ One complication with this approach, combined with the use of a lagged dependent variable, is the possibility of so-called “Nickell bias”. See Nickell (1981). We use robust standard errors in all fixed effect regressions.

⁵ In the GMM estimation, Windmeijer finite-sample corrected standard errors are used. See Windmeijer (2005).

IV. EMPIRICAL RESULTS

The results can be summarized as follows: in regressions that relate real GDP per capita growth, growth volatility, and changes in financial stress to measures of financial structure, the variables proxying for competition, financial buffers, financial globalization, and nontraditional bank intermediation have some statistical significance over the full period 1998–2010. However, for the proxies for financial globalization, the results seem to be driven mainly by the developments since the crisis as re-estimating the regressions using data through 2007 results in some of the relationships losing statistical significance.

Table 3 reports relationships that are robust across several panel data specifications, meaning the coefficients were statistically significant using one of the techniques and did not change sign in the other techniques, and as well, did not change substantively if outliers were removed or other controls were introduced. It is worth noting that our results with respect to income inequality are generally less robust than our results for the other dependent variables, owing to a relative lack of data.

Table 3. Summary of Fixed-effects Panel Estimation Results on Economic Outcomes (1998–2010)

			Dependent Variable											
			Growth			Volatility			Change in Financial Stress			Income Inequality		
Category of Financial Structure	Financial Structure	Term	Full Sample	Advanced Economie	Emerging Economie	Full Sample	Advanced Economie	Emerging Economie	Full Sample	Advanced Economie	Emerging Economie	Full Sample	Advanced Economie	Emerging Economie
Financial globalization	Share foreign banks in total number of banks	Linear	***	**	***	***	***		+		***			**
		Interaction with crisis	*	**	*	**	***				+			
	Total bank foreign assets to GDP	Linear	***	***			+		***		***			
		Quadratic ¹									**			
Competition	Lending spread	Linear	***		***	***		***						**
		Interaction with crisis				***				**		***		***
		Linear	+		+	***		**						
	Concentration	Quadratic ¹				+								
		Linear	***	***	***	***	**	*	***	***		**		**
		Interaction with crisis					***					**	*	**
Financial buffers	Liquid assets/deposits and short-term funding (%)	Linear	***		***				***	***				
		Interaction with crisis												
		Linear			***	**			**		***			
	Equity to total assets (%)	Quadratic ¹	***		***	***			***		***			
		Linear				**			**	***				***
		Interaction with crisis	***			***			***	***				
Nontraditional bank intermediation	Other earning assets to total assets ratio	Linear	***										***	
		Interaction with crisis			**			***	+	+			***	
	Other interest-bearing liabilities to total liabilities ratio	Linear					+						**	
		Quadratic ¹												

Source: IMF staff estimates.

Note: This table summarizes the results of the fixed-effects panel estimation on growth, growth volatility, and financial stress. For each variable, the first two rows represent the coefficients in the interaction specification (see Table 4) while the third and fourth rows represent coefficients in the quadratic specification (see Table 5). +/- indicate the sign of estimated coefficients. ***, **, and * denote statistical significance at the 1 percent, 5 percent, and 10 percent levels of confidence based on robust standard errors. For the definition of dependent variables and independent variables, see Table 2.

¹Square of financial structure measures.

A. Fixed-Effects Panel Regressions with Interaction Terms

To investigate the possible differences between financial structures and economic outcomes during both good times and crisis periods, we run fixed-effects panel regressions with interaction terms (Table 4).

Results for Growth

- A larger share of foreign banks in the domestic banking sector is associated with lower economic growth. This result is robust in the full sample as well as separately for advanced and emerging economies. However, these relationships weaken when regressions are run using a sample that includes only data prior to 2007. Similarly, the interaction terms with crises are also significant in advanced economies, suggesting that having a banking sector with a high share of foreign banks is associated with poor outcomes during crisis periods. This difference between pre-crisis and crisis periods indicates a potentially destabilizing role played by foreign banks during the crisis as they could—and were sometimes forced to—deleverage and retrench relatively quickly.
- The ratio of liquid assets to deposits and short-term funding is positively associated with economic growth in the full sample and in emerging economies, suggesting a positive role for liquidity buffers, possibly driven by the relatively larger emphasis on emerging economies.
- Higher concentration and lending spreads are statistically significantly associated with higher growth and less growth volatility.⁶ One explanation is that higher spreads and lower competition enable banks to earn higher profits, and as a result they are less motivated to take excessive risk and thus less likely to cause or contribute to economic fluctuations. This result could, however, reflect a reverse causality: during periods of high growth, already dominant banks may become more prominent and be able to charge higher lending spreads.

Results for Volatility

- The share of foreign banks in the domestic banking sector is positively associated with volatility, in the full sample and in advanced economies.
- The interaction term with crises is negative in the full sample and advanced economies, suggesting that this positive relationship turns negative if a country is in a banking crisis.

⁶ While higher lending spreads traditionally signal lower competition, more recent economic models of competition show that this is not necessarily the case. A summary of this literature can be found in Degryse and Ongena (2008).

- The relationship between the foreign assets of domestic banks and volatility is not statistically significant in any of the samples. However, the interaction term with crises is significant and negative for the full sample. This may suggest that in times of crisis having large overseas assets could help reduce growth volatility, but the effect is negligible as the coefficient is not economically significant.
- The ratio of liquid assets to deposits has a largely insignificant relationship with economic volatility. For emerging economies, however, the interaction term for liquid assets ratio is significant and negative, suggesting that in times of crisis liquid assets may lower volatility. In the full sample, a higher ratio of equity to total assets is associated with lower volatility.
- The lending spreads have a relationship with volatility that depends on the state of the economy. In non-crisis periods, a higher spread is associated with lower volatility, which may reflect the potentially stabilizing effects of limited competition in the banking sector. However, during crisis periods the higher spread is associated with higher volatility.
- Higher concentration in the banking sector is associated with lower economic volatility in the full sample and in advanced economies.

Results for Financial Stress

- The share of foreign banks in the total number of banks is significant and positive for emerging economies. This indicates that emerging economies are more susceptible to stress related to foreign banks.
- Concentration in the banking sector is insignificant in the full sample, suggesting a limited role for concentration in reducing financial stress. However, the interaction terms are significant and positive in the full sample and advanced economies. This suggests that concentration does not matter much under normal circumstances but increases financial stress in times of banking crisis.

Results for Income Inequality

- Banking sector concentration has a negative association with inequality in times of crisis. This indicates that a lower degree of competition is associated with less inequality. This is potentially linked to the fact that our results suggest that concentration is also positively associated with growth and with lower financial stress.
- The ratio of other earning assets to total assets appears positively associated with the Gini coefficient in advanced economies during “good times” and with emerging economies in times of crisis. This suggests that a higher ratio of other earning assets may be linked to more inequality.

- The share of foreign banks in the number of total banks appears negatively associated with the Gini coefficient in advanced economies, indicating that higher levels of financial globalization may be associated with less inequality.
- The lending spread appears to be positively associated with the Gini coefficient in times of crisis. This result corroborates the result regarding banking concentration: higher levels of banking competition appear to be associated with lower levels of inequality in times of crisis. However, in the emerging economies lower levels of banking competition (higher lending spreads) appear to be associated with lower levels of inequality in normal periods.

Table 4. Fixed-effects Panel Estimation with Interaction Term (1998–2010)

Category	Variable	Growth			Volatility			Financial Stress			Income Inequality		
		Full Sample	Advanced Economies	Emerging Economies	Full Sample	Advanced Economies	Emerging Economies	Full Sample	Advanced Economies	Emerging Economies	Full Sample	Advanced Economies	Emerging Economies
Financial Globalization	Share of foreign banks in total	-0.212*** (0.0605)	-0.181** (0.0679)	-0.283*** (0.0328)	0.0322** (0.0129)	0.0350** (0.0149)	0.0325 (0.0293)	0.0584* (0.0343)	-0.0165 (0.0470)	0.0941** (0.0405)	-0.00253 (0.00918)	-0.0172** (0.00668)	0.0328 (0.0232)
	Interaction of banking crisis dummy and share of foreign banks in total	-0.0326* (0.0172)	-0.0387** (0.0176)	-0.0618*** (0.0214)	-0.00633** (0.00257)	-0.00956*** (0.00230)	0.00229 (0.00716)	-0.0222 (0.0143)	-0.0202 (0.0315)	0.0230* (0.0118)	-0.000154 (0.00263)	0.000883 (0.00204)	-0.0161 (0.0107)
	Number of observations	559	346	194	510	317	176	354	210	131	527	337	171
	R ²	0.483	0.506	0.605	0.621	0.669	0.609	0.373	0.466	0.412	0.762	0.702	0.815
	Total bank foreign assets to GDP	-0.00506 (0.00557)	-0.00459 (0.00550)	-0.357 (0.207)	0.000244 (0.00157)	0.000934 (0.00169)	-0.0180 (0.0467)	0.00102 (0.00883)	0.00344 (0.00955)	-0.227 (0.149)	-0.000303 (0.000720)	-0.000497 (0.000810)	0.0433 (0.0339)
	Interaction of banking crisis dummy and total bank foreign assets to GDP	-0.00211** (0.000947)	-0.00187** (0.000897)	-0.0970 (0.309)	-0.000460** (0.000212)	-0.000320 (0.000218)	0.00887 (0.1000)	0.0106 (0.0143)	0.00220 (0.0131)	1.208*** (0.258)	-1.84e-05 (0.000125)	-2.81e-05 (0.000135)	-0.00308 (0.134)
	Number of observations	429	277	134	389	252	121	256	169	74	407	270	119
	R ²	0.412	0.465	0.565	0.631	0.669	0.618	0.439	0.519	0.548	0.778	0.694	0.862
Competition	Lending spread (lending rate minus deposit rate %)	0.198*** (0.0720)	0.258 (0.293)	0.166** (0.0719)	-0.0813*** (0.0177)	-0.0453 (0.106)	-0.0731*** (0.0170)	-0.119 (0.135)	-0.242 (0.434)	-0.0894 (0.132)	-0.0337 (0.0250)	-0.00572 (0.0763)	-0.0451** (0.0198)
	Interaction of banking crisis dummy and lending spread (lending rate)	-0.285 (0.204)	-0.553 (0.517)	-0.0899 (0.177)	0.171** (0.0650)	0.0617 (0.0887)	0.0849 (0.0732)	-0.197 (0.212)	-1.854*** (0.821)	-0.0856 (0.140)	0.166*** (0.0288)	0.113 (0.0669)	0.201*** (0.0387)
	Number of observations	426	219	188	397	208	172	256	130	113	390	213	158
Banking sector concentration	R ²	0.396	0.436	0.449	0.586	0.636	0.585	0.335	0.419	0.404	0.755	0.625	0.815
	3 Bank asset concentration (%)	0.0822*** (0.0193)	0.0752*** (0.0204)	0.104*** (0.0312)	-0.0135*** (0.00411)	-0.0142** (0.00619)	-0.0146* (0.00800)	-0.00653 (0.0105)	0.000984 (0.0160)	-0.0201 (0.0180)	-0.00278 (0.00444)	-0.00285 (0.00478)	-0.00150 (0.00800)
	Interaction of banking crisis dummy and 3 bank asset concentration (%)	0.0150 (0.0197)	0.00553 (0.0301)	0.0584 (0.0653)	-0.000763 (0.00520)	0.00915** (0.00416)	0.00510 (0.0100)	0.0647*** (0.0171)	0.0657*** (0.0248)	-0.0189 (0.0223)	-0.0108** (0.00417)	-0.00456 (0.00387)	-0.0268** (0.0105)
	Number of observations	548	328	201	500	300	183	350	207	130	507	319	169
Financial buffers	R ²	0.423	0.462	0.487	0.609	0.666	0.592	0.379	0.474	0.399	0.764	0.694	0.811
	Liquid assets/deposits and short-term funding (%)	0.0406*** (0.0141)	0.0218 (0.0149)	0.0880** (0.0325)	0.000865 (0.00587)	-0.000661 (0.00597)	0.00367 (0.0140)	0.00495 (0.0142)	0.00943 (0.0164)	0.000855 (0.0236)	-0.00302 (0.00275)	0.000892 (0.00295)	-0.0102 (0.00616)
	Interaction of banking crisis dummy and liquid assets/deposits and	0.0100 (0.0222)	0.0108 (0.0222)	0.0792 (0.0532)	-0.00175 (0.00669)	0.00783 (0.00657)	-0.0302** (0.0121)	0.0696*** (0.0207)	0.0706*** (0.0216)	0.0352 (0.0250)	-0.00184 (0.00408)	0.000104 (0.00452)	-0.00102 (0.0304)
	Number of observations	572	342	211	522	313	192	353	210	130	529	333	177
	R ²	0.393	0.432	0.488	0.590	0.657	0.563	0.384	0.489	0.391	0.763	0.694	0.812
	Equity to total assets (%)	0.0506 (0.0345)	0.0305 (0.0265)	0.0511 (0.0450)	-0.0129** (0.00630)	-0.00396 (0.00700)	-0.0366 (0.0256)	-0.0166 (0.0129)	-0.0268*** (0.00619)	-0.0201 (0.0303)	-0.00471 (0.00422)	-0.00370 (0.00338)	-0.0100 (0.0172)
	Interaction of banking crisis dummy and equity to total assets (%)	-0.0575 (0.0512)	-0.120 (0.0839)	-0.107 (0.280)	0.0304* (0.0175)	-0.00287 (0.0162)	0.0370 (0.0544)	-0.463*** (0.150)	-1.306*** (0.178)	-0.0660 (0.151)	0.0270 (0.0161)	0.00262 (0.0145)	0.184*** (0.0574)
	Number of observations	577	346	212	527	317	193	354	210	131	534	337	178
Non-traditional banking	R ²	0.378	0.429	0.423	0.594	0.655	0.570	0.386	0.506	0.391	0.762	0.694	0.811
	Other earning assets to total assets	0.0569*** (0.0210)	0.0459 (0.0278)	0.0659 (0.0386)	-0.00917 (0.00654)	-0.000762 (0.00680)	-0.0271 (0.0160)	0.0256 (0.0161)	0.0282 (0.0260)	0.00895 (0.0216)	0.00209 (0.00439)	0.0102*** (0.00364)	-0.0163 (0.0122)
	Interaction of banking crisis dummy and other earning assets to total	0.0331 (0.0313)	0.0342 (0.0326)	-0.257** (0.119)	0.00282 (0.00838)	0.000476 (0.00927)	0.154** (0.0607)	0.0549* (0.0299)	0.0594* (0.0329)	-0.0273 (0.0611)	0.00166 (0.00722)	0.00248 (0.00861)	0.151*** (0.0341)
	Number of observations	462	269	174	415	242	156	305	174	118	426	264	143
	R ²	0.454	0.490	0.510	0.580	0.670	0.522	0.421	0.492	0.422	0.755	0.682	0.814
	Other interest-bearing liabilities to	-0.0145 (0.0212)	-0.0188 (0.0219)	0.00744 (0.0360)	0.0116 (0.00772)	0.00700 (0.00744)	0.0325 (0.0265)	0.0377* (0.0190)	0.0275 (0.0179)	0.0840* (0.0444)	-0.00285 (0.00485)	-0.00797** (0.00379)	0.0236 (0.0209)
	Interaction of banking crisis dummy and other interest-bearing	0.0314 (0.0405)	-0.0139 (0.0376)	0.114** (0.0522)	-0.000111 (0.0107)	0.0141 (0.0102)	-0.0772*** (0.0144)	0.0196 (0.0242)	0.0273 (0.0384)	-0.0258 (0.0370)	-0.0102 (0.00805)	-0.00676 (0.00595)	-0.0107 (0.0252)
	Number of observations	442	266	157	396	239	140	302	173	116	414	261	134
	R ²	0.450	0.479	0.558	0.597	0.672	0.527	0.425	0.488	0.456	0.757	0.671	0.818

Source: IMF staff estimates.

Note: This table summarizes the results of the fixed-effects panel estimation on growth, growth volatility, financial stress, and income inequality. ***, **, and * denote statistical significance at the 1 percent, 5 percent, and 10 percent levels of confidence based on robust standard errors with 5 percent and 10 percent being in green shades. For the definition of dependent variables and independent variables, see Tables 2.

B. Fixed-Effects Panel Estimation with Quadratic Term

To investigate the possibility of a nonlinear relationship among some variables, we use a second degree polynomial (quadratic) approximation for the relations, using fixed-effects panel regressions (Table 5).

Results for Growth

- The ratio of liquid assets to deposits and short term funding is associated with higher growth in emerging economies, and the ratio of equity to total assets is associated with higher growth in the full sample. However, the quadratic term is of the opposite sign, suggesting that the link between the level of financial buffers and positive economic outcomes weakens as buffers accumulate.
- The thresholds are quite high, approximately 74 percent for liquidity buffers and 45 percent for capital buffers, suggesting any dampening economic effect occurs only after these buffers are more than high enough to act as prudential buffers and begin to constrict a bank's normal intermediation activities.
- The ratio of other interest-bearing liabilities to total liabilities is negatively associated with economic growth in the full sample and in advanced economies. This may suggest that a funding structure that depends on other interest-bearing liabilities is unfavorable to economic growth.
- The share of foreign banks in the domestic banking system is negatively related to growth in the full sample and in advanced economies. This is in line with the results in the panel regressions with interaction terms.

Results for Growth Volatility

- In the full sample and advanced economies, greater foreign asset holdings by domestic banks is associated with higher economic volatility, but is associated with lower volatility beyond a certain point.
- A higher level of liquid assets is associated with lower economic volatility in the full sample and in emerging economies. However, beyond a certain point, higher liquidity buffers could increase the volatility, reflecting the possible adverse impact of excess requirements on holdings of liquid assets. A similar pattern exists for the ratio of equity to total assets in emerging economies.

Results for Financial Stress

- The share of foreign banks is positively associated with changes in financial stress in the full sample and in emerging economies. The ratio of total bank foreign assets to GDP is negatively associated with changes in the financial stress in the full sample, suggesting a role for bank foreign assets in smoothing financial stress.

- A higher ratio of liquid assets to deposits and short-term funding is associated with lower financial stress in the full sample and in emerging economies. But this relationship may reverse beyond a certain point in line with its relationship with volatility.
- The ratio of other interest-bearing liabilities to total liabilities is positively associated with financial stress in emerging economies.

Results for Income Inequality

- Banking sector concentration has a negative linear term, but a positive quadratic term, suggesting that concentration is initially associated with falling inequality, but sufficiently high levels of concentration tend to be associated with rising inequality. This suggests that too much concentration in the banking sector can hinder the reduction of inequality.
- The ratio of other earning assets to total assets also has a negative linear term and a positive quadratic term in emerging economies, although it is only marginally significant. This weakly suggests that non-traditional bank activities are initially associated with falling inequality, but sufficiently high levels may be associated with rising inequality.

The thresholds in this exercise should not be viewed as a prudential maximum since what may be an appropriate set of buffers for a specific country will depend on the ability of its financial institutions to manage risk properly and the incidence and size of shocks to which it is subject to. In any event, the thresholds for the capital buffers are above 45 percent for each of the dependent variables and most of the countries that exceed the thresholds were low-income or emerging economies.

Table 5. Fixed-effects Panel Estimation with Quadratic Term (1998–2010)

Category	Variable	Growth			Volatility			Financial Stress			Income Inequality		
		Full Sample	Advanced Economies	Emerging Economies	Full Sample	Advanced Economies	Emerging Economies	Full Sample	Advanced Economies	Emerging Economies	Full Sample	Advanced Economies	Emerging Economies
Financial Globalization	Share of foreign banks in total number of banks	-0.291*** (0.0766)	-0.281*** (0.0886)	-0.119 (0.0810)	0.0301 (0.0233)	0.0348* (0.0181)	-0.0219 (0.0420)	0.109** (0.0513)	-0.0395 (0.0891)	0.180*** (0.0390)	0.000987 (0.0166)	-0.00530 (0.00992)	-0.0210 (0.0532)
	Square of share of foreign banks in total number of banks	0.000832 (0.00121)	0.00100 (0.00119)	-0.00144 (0.00103)	1.67e-05 (0.000202)	3.41e-06 (0.000238)	0.000486 (0.000303)	-0.000898 (0.000674)	-5.48e-05 (0.00159)	-0.00107** (0.000503)	-3.73e-05 (0.000147)	-0.000122 (0.000109)	0.000597 (0.000499)
	Number of observations	559	346	213	510	317	193	354	210	144	527	337	190
	R ²	0.457	0.481	0.552	0.620	0.667	0.599	0.307	0.412	0.403	0.762	0.703	0.813
	Total bank foreign assets to GDP	-0.0147* (0.00791)	-0.0154** (0.00647)	-0.897 (0.546)	0.00312*** (0.000934)	0.00427*** (0.000920)	0.152 (0.107)	-0.0291** (0.0132)	-0.0205 (0.0179)	-0.185 (0.592)	0.000633 (0.00101)	0.000523 (0.00120)	0.0616 (0.107)
	Square of total bank foreign assets	4.43e-06*** (1.56e-06)	4.53e-06*** (1.25e-06)	0.0281 (0.0220)	-8.57e-07*** (1.85e-07)	-1.00e-06*** (1.75e-07)	-0.00808 (0.00575)	0.000129*** (4.33e-05)	8.46e-05 (5.72e-05)	-0.000187 (0.0385)	-3.22e-07 (2.00e-07)	-3.34e-07 (2.26e-07)	-0.000355 (0.00487)
	Number of observations	429	277	152	389	252	137	256	169	87	407	270	137
	R ²	0.396	0.454	0.554	0.633	0.674	0.612	0.353	0.450	0.476	0.779	0.696	0.850
Competition	Lending spread (lending rate minus deposit rate %)	0.456* (0.236)	0.293 (0.494)	0.461* (0.256)	-0.139*** (0.0476)	-0.205 (0.181)	-0.126** (0.0475)	-0.106 (0.209)	-0.284 (0.815)	-0.0841 (0.193)	-0.0161 (0.0513)	0.121 (0.121)	-0.0376 (0.0642)
	Square of lending spread (lending rate minus deposit rate %)	-0.00808 (0.00505)	-0.00215 (0.0681)	-0.00841 (0.00534)	0.00190* (0.00102)	0.0236 (0.0218)	0.00155 (0.000941)	0.000364 (0.00215)	-0.00770 (0.167)	0.000657 (0.00206)	-0.000272 (0.00113)	-0.0189 (0.0179)	9.41e-05 (0.00128)
	Number of observations	426	219	207	397	208	189	256	130	126	390	213	177
	R ²	0.384	0.426	0.438	0.585	0.636	0.579	0.277	0.350	0.365	0.752	0.626	0.806
Banking sector concentration	3 Bank asset concentration (%)	0.0767 (0.0806)	0.0792 (0.131)	0.0874 (0.119)	-0.0264 (0.0287)	0.0156 (0.0365)	-0.0685 (0.0409)	0.0408 (0.0700)	0.0992 (0.107)	0.0310 (0.0937)	-0.0576** (0.0218)	-0.0340* (0.0196)	-0.0768** (0.0326)
	Square of 3 bank asset concentration (%)	4.23e-05 (0.000578)	-1.83e-05 (0.000872)	4.69e-05 (0.000904)	9.46e-05 (0.000203)	-0.000202 (0.000253)	0.000429 (0.000275)	-0.000314 (0.000500)	-0.000645 (0.000756)	-0.000316 (0.000668)	0.000400*** (0.000146)	0.000215 (0.000133)	0.000576** (0.000222)
	Number of observations	548	328	220	500	300	200	350	207	143	507	319	188
	R ²	0.397	0.436	0.454	0.609	0.665	0.586	0.296	0.408	0.377	0.768	0.696	0.812
Financial buffers	Liquid assets/deposits and short-term funding (%)	0.106 (0.0697)	0.0573 (0.0720)	0.291*** (0.0605)	-0.0353** (0.0153)	-0.00295 (0.0141)	-0.0828** (0.0297)	-0.0777** (0.0381)	-0.00953 (0.0716)	-0.149*** (0.0325)	-0.00638 (0.00960)	-0.000308 (0.00895)	-0.0223 (0.0233)
	Square of liquid assets/deposits and short-term funding (%)	-0.000667 (0.000589)	-0.000355 (0.000643)	-0.00196*** (0.000466)	0.000356** (0.000146)	2.96e-05 (0.000153)	0.000781*** (0.000232)	0.000828** (0.000319)	0.000283 (0.000680)	0.00131*** (0.000241)	3.31e-05 (8.09e-05)	1.26e-05 (8.64e-05)	0.000111 (0.000181)
	Number of observations	572	342	230	522	313	209	353	210	143	529	333	196
	R ²	0.373	0.407	0.516	0.597	0.656	0.586	0.318	0.417	0.447	0.763	0.694	0.808
	Equity to total assets (%)	0.121*** (0.0423)	0.0657 (0.0444)	0.0538 (0.201)	-0.0160 (0.0185)	0.00645 (0.0225)	-0.149** (0.0551)	-0.0338 (0.0464)	-0.0927 (0.0603)	-0.132 (0.112)	-0.00864 (0.00727)	-0.00910 (0.00640)	-0.0616 (0.0550)
	Square of equity to total assets (%)	-0.00136*** (0.000429)	-0.000683 (0.000405)	-0.000351 (0.00345)	8.20e-05 (0.000206)	-0.000150 (0.000234)	0.00249** (0.000988)	0.000172 (0.000511)	0.000728 (0.000666)	0.00251 (0.00201)	9.62e-05 (7.54e-05)	9.81e-05 (6.61e-05)	0.00120 (0.000952)
	Number of observations	577	346	231	527	317	210	354	210	144	534	337	197
	R ²	0.360	0.404	0.405	0.593	0.655	0.570	0.302	0.418	0.379	0.762	0.695	0.805
Non-traditional banking	Other earning assets to total assets	0.111 (0.101)	0.0391 (0.150)	0.180 (0.148)	0.0241 (0.0238)	0.0732* (0.0406)	-0.0193 (0.0259)	0.0124 (0.0777)	0.0235 (0.140)	0.0357 (0.0827)	-0.0274 (0.0206)	0.00452 (0.0235)	-0.0704*** (0.0246)
	Square of other earning assets to	-0.000583 (0.00100)	0.000102 (0.00145)	-0.00150 (0.00163)	-0.000367 (0.000243)	-0.000775* (0.000404)	-2.85e-05 (0.000339)	0.000198 (0.000927)	6.66e-05 (0.00158)	-0.000542 (0.000821)	0.000328 (0.000212)	6.08e-05 (0.000236)	0.000690* (0.000354)
	Number of observations	462	269	193	415	242	173	305	174	131	426	264	162
	R ²	0.427	0.463	0.483	0.582	0.683	0.503	0.331	0.415	0.384	0.759	0.682	0.810
	Other interest-bearing liabilities to	-0.0873** (0.0332)	-0.117** (0.0447)	0.000233 (0.121)	0.0442*** (0.0113)	0.0456*** (0.0105)	0.0994* (0.0539)	0.0673* (0.0362)	0.0736* (0.0359)	0.264*** (0.0809)	0.00772 (0.00953)	0.000744 (0.00640)	-0.00377 (0.0365)
	Square of other interest-bearing	0.00112* (0.000587)	0.00132** (0.000556)	-0.000236 (0.00352)	-0.000513*** (0.000116)	-0.000548*** (0.000114)	-0.00244 (0.00160)	-0.000361 (0.000446)	-0.000586 (0.000406)	-0.00572*** (0.00188)	-0.000177* (9.69e-05)	-0.000132 (7.91e-05)	0.000944 (0.00117)
	Number of observations	442	266	176	396	239	157	302	173	129	414	261	153
	R ²	0.430	0.476	0.513	0.608	0.687	0.520	0.345	0.429	0.448	0.758	0.673	0.814

Source: IMF staff estimates.

Note: This table summarizes the results of the fixed-effects panel estimation on growth, growth volatility, financial stress, and income inequality. ***, **, and * denote statistical significance at the 1 percent, 5 percent, and 10 percent levels of confidence based on robust standard errors with 5 percent and 10 percent being in green shades. For the definition of dependent variables and independent variables, see Tables 2.

V. CONCLUSIONS

It is worth repeating again the caveat expressed in Section III: these results should be viewed as suggestive, given the data and econometric issues. However, based on these results we can draw some robust results and offer several tentative policy suggestions.

- Some features can enhance the effectiveness and resilience of a financial system and thus contribute to better economic outcomes. The main features that have these beneficial effects are capital and liquidity buffers. The analysis showed this most clearly for emerging economies; the effect was not significant for advanced economies. This is not as surprising as it may seem: it became clear in the financial crisis that the measured capital and liquidity buffers that we thought were in place in advanced economies were not large enough nor of sufficiently high quality, did not offer the liquidity and solvency protection they were supposed to provide, and had to be raised in the subsequent period of economic downturn.⁷ Buffers in emerging economies were larger and were consistently of higher quality and protected these financial systems more effectively from instability.
- Some features that improve the resilience of a financial system can adversely interact with economic outcomes once they exceed a certain threshold. Capital and liquidity buffers are a case in point. While these financial buffers generally tend to help economic outcomes, the analysis found that beyond certain (fairly high) levels in low-income and emerging economies, they may be associated with lower economic growth, higher volatility of economic growth, and higher financial stress. This result is generally in line with findings of the Basel Committee on Banking Supervision (BCBS, 2010) on the diminishing benefits of buffers. A similar result has also been found in other studies for the influence of credit-to-GDP ratio on economic volatility.
- Some features of a financial system appear to make it more susceptible to financial instability and to poor economic outcomes. These features include a higher level of nontraditional bank intermediation and a high share of foreign banks in the financial sector. This is where a careful interpretation of the results is important: they do not imply that nontraditional bank intermediation and financial globalization are not beneficial. Instead, they suggest that there are some costs to foreign bank presence—particularly in a period leading up to and including severe financial distress. Some previous empirical work suggests that foreign banks' positive role is most likely when those banks are well managed, know their local customer base, and have a commitment to the economy or region.

⁷ Alternatively, the insignificant relationship could reflect the notion that crisis intervention measures substitute for the use of the buffers in past advanced economy crises, serving to cushion economic growth and its volatility.

Our hope is that this working paper, tentative as it is, has provided some insight into the role of financial structure in determining macroeconomic outcomes. Much work remains to be done in this area, particularly as more and better data become available.

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