

Regulating Finance and Regulators to Promote Growth

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Abstract: The operation of the financial system exerts a powerful effect on national rates of economic growth, the distribution of income, and the proportion of people living in poverty. The impact of financial regulations on the operation of financial systems depends—in reasonably predictable ways—on national institutions, such that there is no universal checklist of growth-promoting policies, but there are broad regulatory strategies. Strategies that focus on how policies and institutions combine to shape the incentives of decision-makers within financial institutions—and within the regulatory agencies themselves—work best, as exemplified by an examination of several current regulatory policies.

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I. Introduction

Following the global financial crisis of 2008, countries stabilized their financial systems and attempted to bolster regulatory systems to protect against systemic risks. Disappointing rates of recovery, however, have shifted the policy focus to growth. How important is the operation of the financial system for economic growth and which financial regulatory reforms will improve financial sector operations and promote growth?¹

To assess these questions, I first evaluate the importance of the financial system for economic growth. I use a broad conception of “economic growth” that goes beyond the earnings of the average person and also includes the earnings of individuals throughout the distribution of income. In this way, I provide a more general evaluation of the impact of finance on economic prosperity. Thus, this paper’s first purpose is to assess whether improving the functioning of the financial system is a first-order priority for policymakers seeking to promote economic prosperity.

My second goal is to develop strategic guidelines for improving financial regulations and use these guidelines to assess current regulatory challenges. I employ the phrase “strategic guidelines” because there is no universal checklist of growth-promoting financial policies. Indeed, I will show that no such checklist *can* exist because the same policy produces different results under different economic, political, legal, and regulatory conditions. Nevertheless, research does provide guidance on which types of regulatory strategies work best; and, I use these strategic guidelines to evaluate the growth effects of Dodd-Frank, the regulation of credit rating agencies, capital regulations, and the governance of the regulatory agencies themselves.

¹ For simplicity, I use the term “financial regulation” to refer to the full array of official policies, statutes, regulations, and supervisory practices influencing financial sector activities.

On the finance-growth nexus, research finds that better-developed financial systems accelerate economic growth and shrink income inequality by disproportionately increasing the earnings of lower income families. As discussed in Levine (1997, 2005), finance promotes economic growth primarily by improving the efficiency of capital allocation, not by increasing investment. Thus, finance should not be viewed as a plumbing system, where pouring more credit in one end yields more growth at the other. Rather, finance is like an economy's central nervous system, *choosing* where to allocate resources. It is the incentives shaping these choices that influence economic growth.

Consequently, creating financial regulations that enhance the functioning of the financial system is vital for promoting economic prosperity. When regulations incentivize financial systems to allocate credit to those with the best entrepreneurial ideas and abilities and not simply to those with the most wealth and political connections, this boosts growth. When financial regulations incentivize bank executives to make sound investments, while dissuading them from funding imprudent schemes that simply pad their year-end bonuses, this boosts growth too. Financial regulation is not just about preventing crises; it is also about cultivating financial systems that provide growth-promoting services.

The second part of this paper shows that the impact of financial regulation on the operation of the financial system depends—in reasonably predictable ways—on national institutions and policies. Consider three examples. First, granting greater power to official supervisory and regulatory agencies tends to *damage* the operation of financial systems unless there are extraordinarily effective institutional mechanisms for compelling these agencies to use their powers in the best interests of the public. However, as shown by

Barth, Caprio, and Levine (2006), most countries lack such institutional mechanisms. Consequently, empowering official agencies often goes badly awry, curtailing financial development, increasing corruption, and stymieing economic prosperity.

Second, forcing banks to disclose more information tends to *enhance* the operation of the financial system but only when private investors have both the incentives and legal means to use that information to improve the asset allocation decisions of bank executives. When governments insure debt holders, either explicitly or implicitly, this weakens their incentives to monitor banks regardless of information availability. When legal institutions do not provide small shareholders with the corporate governance mechanisms to influence banks, this hinders market discipline and gives bank executives greater latitude to focus more on maximizing their immediate bonuses and less on the bank's long-run profits. While more transparency never seems to do harm, Barth, Caprio, and Levine (2006) show that effective market discipline requires all three of these interrelated building blocks: information, sound incentives, and effective corporate governance mechanisms.

Third, tightening capital regulations will not necessarily improve the asset allocation decisions of banks and promote economic growth. While many analysts look to capital regulations as a sort of policy panacea for all that ails banks, research suggests that the impact of increasing capital requirements will differ across countries with different nonbanks and securities markets and across banks with different ownership and corporate governance structures (Admati et al. 2011; Laeven and Levine 2009). As one example of the ambiguous effect of capital regulations on the allocation of bank assets, consider the corporate governance of banks. Although the direct effect of more capital is the creation of a larger "cushion" against adverse shocks, an indirect effect could induce insiders to

increase overall bank risk. Since more stringent capital regulations hurts insiders by reducing profits, they might respond by increasing bank risk to compensate for this policy change. While debt holders and salaried managers might resist, the ultimate effect on bank risk depends on the comparative power of these stakeholders within each bank's corporate governance structure. Below, I provide additional examples of how the impact of capital regulations on asset allocation decisions of banks depends on national characteristics.

Although these findings are a bit messy and nuanced, they yield broad strategic guidelines for financial regulatory reforms facing countries today. Here, I emphasize two. First, effective market discipline requires (1) creating a regulatory environment that incentivizes private investors, e.g., debt holders and small shareholders, to monitor and influence bank behavior, (2) forcing bank executives to disclose accurate, comparable, and easily accessible information, and (3) creating sound institutions, so that properly incentivized and well-informed private investors can discipline and govern banks. Countries seeking to enhance market discipline, therefore, must firmly establish all three of these interdependent components. Unfortunately with too-big-to-fail policies dissuading debt holders from monitoring banks and with poorly functioning corporate governance systems making it difficult for small shareholders to oversee executives, exceedingly few countries have effective market monitoring systems, especially for the world's largest banks.

A second strategic guideline is that empowering official regulatory agencies has greater likelihood of improving the functioning of financial systems and promoting economic prosperity when political, legal, and other institutions compel those agencies to act in the public interest. Barth, Caprio, and Levine (2012) explain that this lesson is as relevant for the United States and other advanced countries today as it is for countries with

less well-developed institutions. As the U.S. Dodd-Frank Act grants greater and greater authority to regulatory agencies with close ties to the financial services industry, there has not been a commensurate improvement in the governance of the agencies themselves.

As argued by Barth, Caprio, and Levine (2012), improving the governance of regulatory agencies is crucial for creating an environment that fosters the provision of growth-promoting financial services. If the regulatory authorities themselves are not properly incentivized to interpret and implement policies in the public interest, the particular statutory rules will be ineffective at creating a well-functioning financial system. As the expansion of too-big-to-fail policies and the deterioration of corporate governance undermine market discipline and regulators are burdened with more responsibilities and power, improving the governance of regulatory agencies is essential for cultivating sound incentives within finance and hence for promoting economic prosperity.²

Finally, this paper considers the dynamics of financial development—financial innovation—and the role of regulation in fostering improvements in the quality of financial services. Due to the roles of credit default swaps (CDSs) and collateralized debt obligations (CDOs) in the crisis of 2007-2009, many analysts criticize financial innovation and question its role in promoting economic growth (Stiglitz 2010). They argue that financial innovations are often used to fool investors, circumvent regulations, and facilitate the extraction of large bonuses by financial executives. In fact, the former Chairman of the Federal Reserve, Paul Volcker, made the following skeptical request in a Wall Street Journal (2009) interview, “I wish that somebody would give me some shred of neutral evidence about the relationship between financial innovation recently and the growth of the

² Barth, Caprio, and Levine (2012) suggest how to improve the governance of regulatory agencies.

economy, just one shred of information.” While it is impossible to evaluate the long-run growth effects of such recent financial innovations as CDSs and CDOs, recent research addresses Mr. Volcker’s general skepticism of financial innovation.

Historical evidence and cross-country empirical findings indicate that financial innovation is *necessary* for sustaining technological change and economic growth (Levine, 2010). The very nature of economic growth involves greater specialization and technological complexity. Thus growth itself makes the “old” financial system less effective at screening and monitoring the new, more complex technologies. Without commensurate improvements in financial systems, economies become less effective at identifying and financing growth-inducing endeavors. Laeven, Levine, and Michalopoulos (2011) show that financial systems that rapidly adopt and adapt improved screening methodologies exert a positive effect on growth, while more stagnant financial systems slow economic progress.

The regulatory implications are two-fold. First, regulations that impede sound financial innovations could slow, or even prevent, technological innovations and sustained improvements in living standards. Second, regulations that create incentives for the financial system to use new financial instruments in nefarious and ultimately deleterious ways will impede economic progress even if those instruments could—if employed appropriately—improve the allocation of resources and boost economic prosperity. Growth-promoting regulation is about creating sound incentives and adjusting regulations to maintain sound incentives as financial systems innovate.

The paper proceeds as follows. Section II assesses the impact of the financial system on economic prosperity. Section III discusses which regulatory strategies improve financial systems and evaluates current regulatory challenges. Section IV concludes.

II. Finance and growth, inequality, and poverty

This section presents evidence that the operation of the financial system exerts a powerful effect on national rates of long-run economic growth, the distribution of income, and the proportion of people living in poverty. Moreover, the evidence shows that financial institutions and markets affect the economy primarily by influencing the allocation of resources, not by altering the aggregate savings rate. Therefore, financial regulation can materially influence economic prosperity by shaping the operation of the financial system and hence the economy's capital allocation choices.

II. A. Concepts

Financial markets and intermediaries provide five critical services: they mobilize savings, choose where to allocate those savings, monitor the use of those funds by firms and individuals, provide mechanisms for pooling and diversifying risk, including liquidity risk, and ease the exchange of goods and services.

Financial systems that perform these functions well promote growth. For example, when banks screen borrowers effectively and identify firms with the most promising prospects, this is a first step in boosting productivity growth. When financial markets and institutions mobilize savings from disparate households to invest in these promising projects, this represents a second crucial step in fostering growth. When financial institutions monitor the use of investments and scrutinize their managerial performance, this is an additional, essential ingredient in boosting the operational efficiency of corporations, reducing waste and fraud, and spurring economic growth. When securities markets ease the diversification of risk, this encourages investment in higher-return

projects that might be shunned without effective risk management vehicles. And, when financial systems lower transaction costs, this facilitates trade and specialization, which are fundamental inputs into technological innovation and economic growth.

Financial systems that perform these functions poorly hinder economic growth. For example, if financial systems simply collect funds with one hand and pass them along to cronies, the wealthy, and the politically-connected with the other hand, this produces a less efficient allocation of resources, implying slower economic growth. If financial institutions fail to exert sound corporate governance, this makes it easier for managers to pursue projects that benefit themselves rather than the firm and the overall economy.

The operation of the financial system can also influence the distribution of income in a variety of ways, some of which disproportionately help the poor and others primarily boosting the incomes of the rich. First, better-functioning banks focus more on a person's ideas and abilities than on family wealth and political connections when allocating credit. Second, by enhancing the quality of financial services, financial development will naturally benefit heavy users of financial services, which are primarily wealthy families and large firms. Finally, finance can also affect the distribution of income through its effects on labor markets. For example, improvements in finance that boost the demand for low-skilled workers will tend to tighten the distribution of income. And, the financial system helps determine whether people live in a dynamic, growing economy or whether they must find work in a more stagnant environment.

II.B. Banks, growth, inequality, and the poor

A growing and diverse body of empirical research produces a remarkably consistent, though by no means unanimous, narrative: The services provided by the financial system exert a first-order impact on (1) the rate of long-run economic growth, primarily by affecting the allocation of capital and (2) the distribution of income, primarily by affecting the earnings of lower income individuals. This message emerges from cross-country analyses, panel techniques that exploit both cross-country differences and changes in national performance over time, microeconomic-based studies that examine the underlying mechanisms through which finance may influence economic growth, and individual country cases. Rather than reviewing the entire empirical literature on finance and growth as in Levine (1997, 2005), I illustrate the literature's major findings first by using cross-country comparisons and then by presenting evidence from the United States. Although I use simple ordinary least squares regressions and figures to illustrate the results, an extensive body of research confirms these findings when using instrumental variables and other techniques to identify the causal impact of financial development on economic performance.

II.B.i. Cross-country evidence

Broad cross-country evaluations of the impact of financial development on growth use one observation per country, where the data are typically averaged over 30 or 40 years. The studies control for many other possible determinants of economic growth such as initial income, educational attainment, inflation, government spending, openness to trade, and political instability (King and Levine 1993; Levine 1998, 1999; Levine, Loayza,

and Beck 2000; Beck, Levine, and Loayza 2000). These studies also examine whether financial development is associated with productivity growth and capital accumulation, which are two channels through which the operation of the financial system can influence growth.

To measure financial development, cross-country studies typically use *Private Credit*, which equals banks credit to the private sector as a share of gross domestic product. This is a problem. We would like to measure the quality of the financial services available in an economy. But, *Private Credit* does not directly measure the effectiveness of the financial system in mobilizing savings, allocating capital, monitoring the use of that capital, providing risk managements services, and easing transactions. Rather, *Private Credit* measures the size of the financial intermediary sector. Another problem is that *Private Credit* focuses on banks and does not consider the broader array of financial institutions and markets. In its defence, *Private Credit* excludes loans to the government and state-owned enterprises and therefore gauges the intermediation of private credit. Furthermore the same results hold when using a broader measure that includes credits issues by nonbank financial institutions (not just bank credit) and when incorporating measures of stock market development.

Figure 1 illustrates that countries with better-developed financial systems grow faster. Based on Levine, Loayza, and Beck (2000), this partial scatter plot shows the relationship between growth and *Private Credit* over the 35 years between 1960 and 1995 while controlling for some of the other potential growth determinants noted above. Furthermore, Beck, Levine, and Loayza (2000) show that financial development boosts growth primarily by enhancing the efficiency of capital allocation. The connection between

financial development and the savings rate is weaker. Thus, it is the choices that the financial system makes in allocating society's resources that shape national growth rates.

Figure 2 illustrates that countries with better developed financial systems tend to experience reductions in income inequality, as measured by the growth rate of the Gini coefficient of income inequality. Critically, this result holds when controlling for the economy's aggregate growth rate and the level of overall economic development, as well as a wide array of other country-specific characteristics (Beck, Demirguc-Kunt, and Levine 2007). Thus, financial development tightens the distribution of income above and beyond any effect running through economic growth on the level of economic development.

Figures 3 and 4 show that financial development disproportionately boosts the incomes of those at the lower end of the distribution of income, including the incomes of the extremely poor. As illustrated in Figure 3, *Private Credit* boosts the income growth of the poorest quintile, even after controlling for many other country characteristics, including the rate of economic growth and the level of economic development (Beck, Demirguc-Kunt, and Levine 2007). One can push this further and focus on the extremely poor, i.e., those living on less than two-dollars per day.³ Figure 4 shows that financial development is associated with a reduction in the fraction of the population living in extreme poverty. Critically, these results hold when controlling for average growth. It is not just that finance accelerates economic growth, which trickles down to the poor; finance exerts a *disproportionately* positive influence on lower income individuals.

³ Data on the fraction of the population living on less than \$2/day is limited to less developed countries over the period from 1980 to 2005.

II.B.ii. U.S. evidence on finance, growth, inequality, and the poor

The U.S. states provide a unique setting in which to examine further the causal impact of improvements in the quality of banking services on economic growth, the distribution of income, and the poor. From the mid-1970s to the mid-1990s, individual U.S. states removed regulatory restrictions on opening banks branches within its boundaries. States changed their regulatory policies in different years. The reforms intensified competition and triggered improvements in banking services, reducing interest rates on loans, raising them on deposits, lowering overhead costs, spurring the development of better techniques for screening and monitoring firms, and reducing the proportion of bad loans on the books of banks (Hubbard and Palia 1995, Jayaratne and Strahan 1998).

The driving forces behind the financial reforms that enhanced the quality of financial services were largely independent of state-specific changes in growth, income inequality, and labor market conditions. Kroszner and Strahan (1999) show that technological, legal, and financial innovations diminished the economic and political power of banks benefiting from geographic restrictions on banking. The invention of automatic teller machines (ATMs), in conjunction with court rulings that ATMs are not bank branches, weakened the geographical bond between customers and banks. Furthermore, checkable money market mutual funds facilitated banking by mail and telephone, which weakened local bank monopolies. And, improvements in credit scoring techniques, information processing, and telecommunications reduced the informational advantages of local banks. These innovations reduced the monopoly power of local banks and therefore weakened their ability and desire to fight for the maintenance of these

restrictions on competition. State by state, the authorities removed these restrictions over the last quarter of the 20th century.

Although a slight digression, it is valuable to recognize that policymakers did not remove these regulations because of new, convincing information that they were hindering competition and the provision of high-quality financial services. There was already plenty of information about the adverse effects of the regulatory restrictions. Rather, technological innovation reduced the rents that banks earned from these protective regulatory restrictions, which weakened their desire to lobby for their continuation. Perhaps if the regulatory institutions had better represented the interests of the public, these growth-retarding policies would have been removed earlier. As I will emphasize below, effective governance of financial regulatory institutions can materially influence growth.

To examine growth, I trace out the year-by-year effects of the removal of geographic restrictions on intrastate bank branching on the logarithm of Gross State Product per capita (*GSP*). I plot *GSP* during the decade before a state deregulated and then plot what happens after a state removed restrictions on competition. *GSP* in each year is measured relative to *GSP* in the year of deregulation. Figure 5 plots the results and the 95% confidence intervals. In the figure, the zero date is the year in which a state removed these restrictions on competition, which differs across the states because they deregulated in different years.

Figure 5 illustrates that the removal of geographic restrictions on intrastate banking—which improved the quality of banking services—boosted economic growth.

There is a significant increase in *GSP* immediately after deregulation and this impact grows over time.

Figures 6 - 8 demonstrate that easing restrictions on intrastate banking (1) reduced income inequality by increasing the incomes of those at the lower end of the distribution of income and (2) lowered the unemployment rate (Beck, Levine, and Levkov 2010). Figure 6 illustrates that the impact of deregulation on inequality grows for about eight years and then the effect levels off. Ultimately, there is a drop in the Gini coefficient of income inequality of about 4%. Figure 7 shows that intrastate branch deregulation tightened the distribution of income by disproportionately raising incomes in the lower part of the income distribution. Finally, Figure 8 shows that the removal of restrictions on intrastate branching was associated with a significant drop in the unemployment rate, with a cumulative effect of more than two percentage points after 15 years.

II.C. Banks, markets and growth

While the evidence above indicates that the functioning of banks influences economic growth and the distribution of income, this ignores equity and bond markets. Are securities markets simply casinos where the rich come to place their bets, or do the services provided by financial markets also affect the allocation of capital and long-run rates of economic growth? A considerable body of theoretical and empirical research tackles this question.

Theory suggests that financial markets matter for growth too (Levine 1991). For example, as securities markets become larger and more liquid, it is easier for an investor who has acquired information to profit by quickly trading in the market based on that

information (Holmstrom and Tirole 1993). Thus, larger, more liquid markets will increase the incentives of investors to expend resources researching firms, enhancing the efficiency of resource allocation and fostering growth. As another example, liquid, well-functioning stock markets can improve corporate governance. For example, public trading of shares in stock markets that efficiently reflect information about firms allows owners align the interests of managers with those of owners by linking managerial compensation to stock prices (Jensen and Murphy 1990). Similarly, if takeovers are easier in well-developed stock markets and if managers of under-performing firms are fired following a takeover, then better stock markets can promote better corporate control. The threat of a takeover will also help align managerial incentives with those of the owners (Scharfstein 1988).

The empirical evidence indicates that better-developed securities markets encourage economic growth by boosting the efficiency of resource allocation (Levine and Zervos 1998; Beck and Levine 2002). Measures of stock market liquidity—how much trading occurs in the market—are closely associated with economic growth. However, simple measures of the size of the market, as measured by stock market capitalization, are not robustly linked with economic performance.

Furthermore, both bank and stock market development are independently associated with growth, suggesting that the policy debate about whether to promote a bank-based system or a market-based financial system misses the big point. Banks *and* markets matter for growth. This does not imply banks and markets play the same roles in all economies. Indeed, as countries become more developed, new research indicates that markets become increasingly important for promoting economic activity (Demirguc-Kunt, Feyen, and Levine 2011). While still requiring additional work, this suggests that poor bank

regulations are particularly costly in countries at low-levels of economic development, while regulations impeding market development have larger adverse effect in richer countries.

II.D. Financial innovation and growth

So far, I have ignored the dynamics of financial development: How does financial innovation fit into the process of economic growth? Given the roles of credit default swaps, collateralized debt obligations, and other new financial instruments in the recent financial crisis, financial innovation has gotten a bad reputation. From this perspective financial innovations are mechanisms for fooling investors, circumventing regulatory intent, and boosting the bonuses of financiers without enhancing the quality of the services provided by the financial services industry. But, such a perspective is too narrow.

A broader, long-run consideration of financial development suggests that financial innovation is *essential* for growth. Adam Smith argued that economic growth is a process in which production become increasingly specialized and technologies more complex. As firms become more complex, however, the “old” financial system becomes less effective at screening and monitoring firms. Therefore, without corresponding innovations in finance that match the increases in complexity associated with economic growth, the quality of the financial services diminishes, slowing future growth.

Several examples from history illustrate the crucial role of financial innovation in sustaining economic growth. Consider first the financial impediments to railroad expansion in the 19th century. The novelty and complexity of railroad made preexisting financial systems ineffective at screening and monitoring them. Although prominent local investors

with close ties to those operating the railroad were the primary sources of capital for railroads during the early decades of this new technology, this reliance on local finance restricted growth.

So, financiers innovated. Specialized financiers and investment banks emerged to mobilize capital from individuals, screen and invest in railroads, and monitor the use of those investments, often by serving on the boards of directors of railroad corporations (Carosso, 1970). Based on their expertise and reputation, these investment banks mobilized funds from wealthy investors, evaluated proposals from railroads, allocated capital, and governed the operations of railroad companies for investors. And, since the geographical size and complexity of railroads made it difficult for investors to collect, organize, and assess price, usage, breakdown, and repair information, financiers developed new accounting and financial reporting methods.

Next, consider the information technology revolution of the 20th century, which could not have been financed with the financial system that fueled the railroad revolution of the 19th century. Indeed, as nascent high-tech information and communication firms struggled to emerge in the 1970s and 1980s, traditional commercial banks were reluctant to finance them because these new firms did not yet generate sufficient cash flows to cover loan payments and the firms were run by scientists with little experience in operating profitable companies (Gompers and Lerner, 2001). Conventional debt and equity markets were also wary because the technologies were too complex for investors to evaluate.

Again, financiers innovated. Venture capital firms arose to screen entrepreneurs and provide technical, managerial, and financial advice to new high-technology firms. In many cases, venture capitalists had become wealthy through their own successful high-

tech innovations, which provided a basis of expertise for evaluating and guiding new entrepreneurs. In terms of funding, venture capitalists typically took large, private equity stakes that established a long-term commitment to the enterprise, and they generally became active investors, taking seats on the board of directors and helping to solve managerial and financial problems.

Finally, consider the biotechnology revolution of the 21st century, for which the venture capital modality did not work well. Venture capitalists could not effectively screen biotech firms because of the scientific breadth of biotechnologies, which frequently require inputs from biologists, chemists, geneticists, engineers, bioroboticists, as well as experts on the myriad of laws, regulations, and commercial barriers associated with successfully bringing new medical products to market. It was unfeasible to house all of this expertise in banks or venture capital firms. Again, a new technology promised growth, but the existing financial system could not fuel it.

Yet again, financiers innovated. They formed new financial partnerships with the one kind of organization with the breadth of skills to screen bio-tech firms: large pharmaceutical companies. Pharmaceutical companies employ, or are in regular contact with, a large assortment of scientists and engineers, have close connections with those delivering medical products to customers, and employ lawyers well versed in drug regulations. Furthermore, when an expert pharmaceutical company invests in a bio-tech firm this encourages others to invest in the firm as well. Without financial innovation, improvements in diagnostic and surgical procedures, prosthetic devices, parasite-resistant crops, and other innovations linked to bio-technology would almost certainly be occurring at a far slower pace.

By focusing on the co-evolution of financial and economic systems, two policy implications emerge. First, without denying the potentially harmful effects of some forms of financial innovation, these historical examples and new cross-country empirical findings by Laeven, Levine, and Michalopoulos (2011) suggest that financial innovation is necessary for fostering technological innovations and sustaining economic growth. Thus financial regulations that stymie healthy financial innovation could slow, or even stop, economic growth.

Second, regulation should focus on *maintaining* sound incentives in a dynamic economy. Regulation influences the degree to which the financial system has incentives to create and use new financial products to avoid the intent of regulatory policies, facilitate excessive risk-taking, and make it easier for executives to extract large bonuses to the detriment of the financial institutions or whether the financial system is primarily motivated to develop and use financial innovations to enhance the screening and monitoring of investments, managing risk, and easing transactions.

II.E. Discussion

The services provided by financial institutions and markets are very important for determining the rate of economic growth, the distribution of income, and whether individuals can attempt to fulfill their economic aspirations. Thus, financial regulations exert a powerful influence on human welfare by shaping the quality of financial services available to an economy. This leads to the next, more challenging, question: Which financial regulations cultivate financial systems that provide growth-enhancing services and innovate in ways that support economic growth and prosperity?

III. Regulating banks, regulating regulators, and the operation of financial systems

III. A. Some humbling boundaries

Which financial regulations enhance the operation of financial systems? Some might view this as a technical question, for which there is a universal, albeit detailed, answer, e.g., a capital ratio of 9%, a liquidity ratio of 3%, deposit insurance less than the income of the 95th-percentile household, banks permitted to hold voting shares in nonfinancial corporations, supervisory verification of the sources of funds to be used as capital, supervisory power to change a bank's organizational structure, bank directors legally liable for disclosing erroneous or misleading information, etc.

As I illustrate below, however, there is no universal set of best practices. What is appropriate for promoting well-functioning markets and banks in the United States will not necessarily succeed in countries with different economic, financial, and institutional conditions. And, the policies and regulations that promoted well-functioning markets and banks in the 1980s will not necessarily succeed today because economic, financial, and political conditions have changed. There is no common, static checklist of growth-promoting financial regulations.

But, there are principles and strategies. Recent cross-country empirical research is starting to provide guidance on which regulatory strategies enhance the operation of financial systems under different circumstances. This research is comparatively new. Until about a decade ago, there were no comprehensive cross-country studies of financial regulation because there were no data. Researchers have worked to rectify this situation. Barth, Caprio, and Levine (2004, 2006, 2008) surveyed bank regulatory and supervisory

agencies in over 100 countries. La Porta, Lopez-de-Silanes, Shleifer, and Vishny (2000) and La Porta, Lopez-de-Silanes, and Shleifer (2006) assembled cross-country data on the regulation of securities markets. I will focus on bank regulation in this paper but, it is comforting to note, that the findings from research on securities markets yield similar conclusions about which regulatory strategies work best.

In this section, I use cross-country empirical research on bank regulation to articulate strategic guidelines for enhancing financial regulation and apply these guidelines to a few major regulatory challenges facing authorities today. Since the underlying research investigations are new and subject to several statistical limitations discussed in Barth, Caprio, and Levine (2006), the strategic guidelines and policy recommendations stemming from these studies should also be viewed cautiously. One conceptual issue worth emphasizing here is that I build from narrow findings to broad lessons. I take the results from regression analyses that use specific measures of bank performance, bank regulations, and national institutions and use those analyses to draw broader, strategic inferences.

I focus on three areas of bank regulation. The first stresses the empowerment of official agencies to regulate, supervise, and discipline banks. The second area emphasizes regulations associated with market monitoring, including information disclosure rules and regulations that affect the incentives and ability of private investors to monitor and discipline banks. And, the third focuses on capital regulations. While these are commonly known as the three pillars of the Basel Committee on Bank Supervision, I use these categories in a broad context, not as a narrow definition of the Basel recommendations.

III.B. Empowering official regulators

III.B.i. Findings

To measure the power of official regulatory and supervisory agencies, several papers use an index constructed by Barth, Caprio, and Levine (2006). The *Official Power* index measures whether bank supervisors can take specific actions against bank management and bank owners both in normal times and times of distress. This includes information on whether the supervisory agency can force a bank to change its internal organizational structure, suspend dividends, stop bonuses, halt management fees, force banks to constitute provisions against actual or potential losses as determined by the supervisory agency, supersede the legal rights of shareholders, remove and replace managers and directors, etc. Thus, I interpret the *Official Power* index as a general indicator of the power of official supervisory and regulatory agencies over banks.

The impact of empowering official agencies is not always positive; it depends on the governance and oversight of those agencies. When political, legal, and other institutions can compel the regulatory authority to use their powers to promote the public interests, empowering official agencies tends to have a positive effect on the services provided by banks to the economy. However, without effective mechanisms for aligning the incentives of regulators with those of the public, empowering official regulators tends to go badly awry. Empowering regulatory agencies that have been captured by the financial services industry simply provides the agencies with greater means to promote and protect the profits and positions of existing financiers. Empowering regulatory agencies that have been captured by narrow political interests simply facilitates their ability to funnel credit their constituents.

In fact, Barth, Caprio, and Levine (2004, 2006) show that empowering official regulators tends to have adverse effects. Very few countries effectively govern and oversee their regulators. In the vast majority of countries, increasing official regulatory power hurts the functioning of the financial system, with clear ramifications on economic growth, the distribution of income, and poverty.

Consider a few examples from the literature. Barth, Caprio, and Levine (2006) show that countries with more powerful regulatory agencies tend to have lower levels of *Private Credit* when they do not have extremely well-developed democratic political institutions. Similarly, Beck, Demirguc-Kunt, and Levine (2006) show that large *Official Power* tends to increase corruption in bank lending, as measured by surveys of firms, unless the country has very well-developed democratic political institutions. And, Houston, Lin and Ma (2010) show that empowering official regulators increases corruption in banking less when the country has a competitive, privately-owned media. When a competitive, independent media effectively investigates the design and implementation of financial policies, this disciplines the political and regulatory process, making it more difficult for a few elites to manipulate the rules and institutions shaping financial activities.

Regulatory agencies in most countries might reject these findings as inapplicable to their particular agencies. Although they might argue that *they* operate in the public interest because of the strong moral values of their officials and the effective governance of their regulatory agencies, I am skeptical. First, the results are clear. For between 65% and 85% of the countries, greater regulatory power is associated with bad outcomes, suggesting that national institutions do not effectively induce financial regulatory authorities to improve the operation of financial systems.

Second, as stressed by Barth, Caprio, and Levine (2012), it is unclear whether *any* country has an independent institution— independent of the financial services industry and short-run political machinations—that has the information and expertise to assess financial regulation from the perspective of the public and the prominence to communicate its concerns to regulators, legislatures, and the public. There is no organization with the information and human capital skills (including economists, lawyers, accountants, etc.) to evaluate financial regulation and the financial regulatory authorities. If the public and its representatives cannot obtain an informed expert assessment of the full constellation of financial regulations from an independent source, how can it effectively govern regulators? There is certainly room for substantially improving the governance of financial regulators.

Third, although I believe that virtually all financial regulatory officials operate with the utmost integrity and seek to promote the public interest, simply relying on the moral compass of regulators does not represent a sound governance system. An enormous body of evidence suggests that the financial services industry exerts undue influence on the setting of financial policies by governments and the interpretation and implementation of those policies by financial regulatory agencies through an assortment of mechanisms, suggesting that the good intentions of officials are insufficient.⁴ Rather than relying on the moral compasses of individual officials to resist the pressures of politicians looking out for particular constituents or the pressures of the financial services industry, institutional mechanisms should be designed and enhanced to support their tendencies to work in the interests of the public at large.

⁴ A few references include Barth, Caprio, and Levine (2012), Johnson and Kwak (2010), Kroszner (1998), and Kroszner and Stratmann (1998).

III.B.ii. Empowering regulators: Lessons and an application

These empirical findings suggest a big strategic lesson: enhancing the governance of regulatory institutions is a first-order issue in improving the quality of financial services and hence the rate of long-run economic growth. In most countries, research indicates that increasing the power official regulatory agencies tends to hurt financial development and hinder the efficiency of credit allocation because most countries do not have effective means for governing those agencies. Since the operation of the financial system affects growth and since official regulators affect the operation of the financial system, the governance of official regulators—the degree to which they act in the public interest—is critically important for promoting economic prosperity.

This lesson is as applicable today for the United States as it is for countries with less well-developed institutions. As the public and its elected representatives grant regulatory agencies more power, governance matters *more*, i.e., institutional reforms that improve the governance of regulatory agencies will now pay larger growth dividends.

For example, the Dodd-Frank Act in the United States—as well as legislative reforms in other countries—grants greater authority to official supervisory entities over systemically important financial institutions. Although the United States has comparatively well-functioning institutions, this does not obviate concerns about the potentially adverse effects of empowering regulatory agencies. To maximize the benefits and minimize the risks from granting regulatory authorities greater discretionary power, new mechanisms—commensurate with the increase in official power and the greater complexity of the financial system—should be implemented to enhance the transparency of regulation and compel regulators to use their new powers for the public good.

Observers have raised concerns about the governance of the U.S. Federal Reserve, which is the major financial regulator in the United States (e.g., Johnson and Kwak 2010; and Barth, Caprio, and Levine 2012). Banks play a role in choosing some of the Fed's executives. People flow between the Fed and the financial services industry, raising concerns that this "revolving door" threatens the Fed's independence and its ability to represent the broad interests of the public. And, the daily interactions between regulator and regulated can influence the perspectives of regulators, such that regulators take a narrow, skewed view of regulatory policies. In this paper, I simply emphasize the growth benefits from enhancing the governance of the financial regulatory authorities, including those in the most developed economies. Barth, Caprio, and Levine (2012) provide specific proposals for accomplishing this goal.

In my opinion, improving the governance of financial regulatory agencies is the primary challenge to creating a regulatory environment that fosters the provision of growth promoting financial services. If the regulatory authorities themselves are not properly incentivized and governed to interpret and implement policies in the public interest, the particular statutory rules will be ineffective at creating a well-functioning financial system. As more and more responsibilities are heaped on regulators, improvements in their governance is essential to cultivating sound incentives within finance and fostering the types of financial sector innovations that are necessary for sustaining economic growth.

III.C. Market monitoring and discipline of financial institutions

III.C.i. Findings

Many researchers and official agencies, such as Basel, stress the importance of market discipline—incentivizing and empowering private investors to monitor and govern financial institutions prudently. When a bank's debt holders have the incentives and information to monitor bank behavior, they can help constrain bank risk taking by demanding higher yields as risk increases. And, when small shareholders have the information and legal means to influence bank behavior, they can constrain the ability of bank insiders to extract private rents from managing the bank. But, effective market discipline relies on three interdependent components: the incentives of private investors (e.g., debt holders and small shareholders), the availability of accurate, useful information, and the institutional means for private investors to use that information to influence banks. When governments insure debt holders, this weakens their incentives to monitor financial institutions regardless of the transparency of information. When legal institutions do not operate effectively, small stock holders find it corresponding more difficult to discipline financial institutions even if they have sound information and incentives.

To examine these themes, Barth, Caprio, and Levine (2006) construct a *Private Monitoring* index that gauges the degree to which regulations (1) incentivize private debt holders to monitor banks and (2) force banks to disclose accurate information to facilitate private investor monitoring. This index includes information on whether bank directors and officials are legally liable for the accuracy of information disclosed to the public, whether banks must publish consolidated accounts, whether banks must be rated and audited, whether banks must be audited by certified international auditors, whether

subordinated debt is allowable (which may create a class of private monitors), and whether there is both no explicit deposit insurance and no actual insurance was paid the last time a bank failed. Though imperfect, this is a broad measure of the degree to which regulations motivate private investors to monitor banks and force banks to disclose accurate information to these investors.

Research shows that the *Private Monitoring* index is positively associated with bank performance, but only in countries that provide private investors with sufficient legal means to influence banks, which includes about half of the 90 or so countries in the Barth, Caprio, and Levine (2006) sample. Increases in *Private Monitoring* do not always significantly improve the financial system. But, unlike *Official Power*, increases in *Private Monitoring* are never associated with a significant deterioration in bank development or the efficiency of credit allocation.

For example, larger values of the *Private Monitoring* index are associated with increases in *Private Credit* (Barth, Caprio, and Levine 2006) and reductions in corruption in bank lending in countries with legal systems that effectively promote the rule of law (Beck, Demirguc-Kunt, and Levine 2006). And, Barth, Lin, Lin and Song (2009) focus on the connection between information disclosure and the role of competition in intensifying the incentives of investors to monitor banks. Barth, Lin, Lin and Song (2009) argue that (a) more competition among banks will increase the incentives of investors to monitor banks because competition increases the costs of any bank inefficiencies, and (b) this intensification of monitoring incentives will only affect bank behavior if investors have good information about the bank. Indeed, they find that more intense competition among

banks boosts the efficiency of credit allocation, but only when there is sound information disclosure.

While incentivizing and empowering debt holders to monitor banks are often viewed as mechanisms for restraining bank risk, the effectiveness of market discipline influences the capital allocation decisions of banks and hence growth, the distribution of income, and the incomes and opportunities of the poor. Financial regulation is not only about risk; it is about economic prosperity more generally.

III.C.ii. Market Discipline: Lessons and applications

The strategic lesson is straightforward: Effective market discipline enhances the operation of banks, *but* effective market discipline requires (1) creating a regulatory environment that does not adversely distort the incentives of private investors to monitor and influence bank behavior, (2) forcing the disclosure of accurate, comparable, easily accessible information about banks so that that investors can effectively monitor them, and (3) creating sound institutions, so that well-incentivized, well-informed private investors can enhance the governance of banks.

Very few countries, however, have all three of these three interdependent ingredients, especially for the largest banks. Without all three components, other mechanisms besides small shareholders and debt holders—such as large shareholders, executives, and official regulators—will play comparatively larger roles in governing banks.

These lessons are applicable to two policy challenges highlighted by the recent crisis. First, consider “too-big-to-fail” (TBTF), which implies that the financial institution is so big and interconnected that regulatory authorities believe that its failure would be so

disruptive to the financial system that they would not permit the bank to fail and default on its debt obligations. TBTF reduces the incentives of debt holders to monitor large financial institutions, which impedes market discipline and hence hinders the efficiency of capital allocation. When a bank (a) is TBTF and (b) is owned by diffuse shareholders with limited tools to monitor and govern the bank's executives, who will constrain those executives whose incentives too often do not align with shareholders, debt holders, or the public at large? Only the regulatory authorities seem capable, on paper, of constraining executives. But, as noted above, the executives of large banks often successfully influence those very regulatory agencies. Thus, undoing TBTF is crucial for enhancing market discipline to improve the incentives governing the capital allocation choices of major banks.

Next, consider credit rating agencies (CRAs). CRAs affect the allocation of capital by rating securities. If they raise concerns about a firm, the prices of its securities fall—the most basic form of market discipline—and investors alter their asset allocation decisions. If CRAs make poor assessments, this hurts the efficiency of capital allocation, slowing growth.

Current regulations both increase the influence of CRAs on investment decisions and reduce the quality of their assessments. For example, many regulators of banks, investment banks, insurance companies, and pension funds set capital requirements and portfolio guidelines based on credit ratings, compelling these institutions to use CRA assessments in making investments regardless of the accuracy of the CRAs. At the same time, regulations protect CRAs from bearing full responsibility for their assessments since CRAs face little financial or legal liability for their assessments. Thus, while these regulations insure that CRAs play a central role in credit allocation, they simultaneously insure that the CRAs are insulated from the consequences of doing a lousy job. Regulating

CRA is not just about risk; it is also about growth. Although the Dodd-Frank Act attempted to reform CRA regulation, these reforms have been postponed—indefinitely.

III.D. Capital regulations

III.D.i. Findings

The impact of capital regulations on resource allocation is complex, nuanced, and empirical work does not provide clear guidance on the growth effects. Capital regulations are most commonly viewed in terms of providing a “cushion,” such that banks with more capital can absorb a bigger adverse shock to the value of their risky assets before the bank is unable to meet its obligations to debt holders. But, capital regulations can also have growth effects. One way in which capital regulations can affect the economy is by directly altering the allocation of credit. To the extent that more stringent capital regulations induce banks to shift out of making investments in new and growing corporations and into government securities, and no other sources of capital substitute for this reallocation, these regulations will have clear implications for the emergence of new firms and expansion of old ones. But, many factors can complicate the effect of capital regulations on growth and stability. Capital regulations can affect how banks allocate their loans, not just the quantity of those loans. New channels for financing firms can blossom, including through nonbanks and securities markets. And, banks might raise more funds by issuing equity, dampening or eliminating the effect of capital regulations on the quantity of their loans to corporations.

Let’s consider one complication: how banks alter the composition of their assets in response to more stringent capital regulations. Economic theory suggests that the impact of capital regulations on the bank’s incentives concerning the allocation of its risky assets

depends on bank-specific and country specific characteristics. Specifically, bank equity claimants, i.e., shareholders and managers whose compensation is strongly connected to equity prices, typically want more risk than debt holders and salaried managers (Jensen and Meckling 1976). Equity claimants get the full benefits of successful gambles, but share the losses with debt holders. In contrast, debt holders get essentially none of the benefits from high-risk, high-return investments, but suffer from failed investments. Consequently, debt holders want the bank to undertake low-risk investments that generate enough cash-flow to pay them back. The incentives of salaried managers typically align with debt holders, as salaried employees do not directly share in the profits from high-risk, high-return investments (Saunders, Strock and Travlos 1990). Given these tensions, each bank will choose a particular risk profile based on the comparative power of equity holders, equity-compensated managers, salaried managers, and debt holders within the corporate governance structure of the bank—which reflect legal and regulatory institutions.

An increase in capital stringency will upset this balance. While the direct effect of more capital is the creation of a larger “cushion” that reduces the riskiness of the bank, an indirect effect could induce bank decision makers to increase the riskiness of other assets such that overall riskiness could rise. To see this, note that more stringent capital regulations tend to hurt equity claimants by reducing their profits. Consequently, more stringent capital regulations can incentivize equity claimants to push the bank to increase risk taking as compensation for this adverse change (Kim and Santomero 1994; Koehn and Santomero 1980). While debt holders will resist, the results is a matter of comparative power within the bank. Moreover, since the corporate governance structure of banks differs systematically across countries with different legal and regulatory systems (Caprio,

Laeven, and Levine 2007), the same capital regulation can have different effects on bank behavior depending on cross-country differences in corporate law and bank regulations. For example, in some countries regulations prohibit the emergence of a large owner, while majority shareholders play the dominant role in running banks in many other countries.

The empirical results confirm this intuition: more stringent capital regulations tend to reduce risk taking in banks where salaried managers play a dominant role in running the bank, but tend to increase risk taking in banks where equity claimants have comparatively more power (Laeven and Levine 2009). Again, the evidence shows that the same regulation in different environments produces different effects. One size does not fit all.

III.D.ii. Capital regulations: Lessons

The lessons on capital regulations and growth are incomplete, complex, and hence unsatisfying, especially given their central role in bank regulation. The impact of capital regulations on the capital allocation decisions of banks depends on the comparative power of bank equity holders, equity-compensated executives, salaried managers, debt holders, and regulators, which reflect other national laws and regulations.

But, the possible effects of capital regulation on growth are even more complex than this. We do not have sufficient empirical evidence about the overall response of an economy to more stringent capital regulations. If banks simply change their portfolios by switching some of their risky assets into government bonds and if they do not raise more capital and if they do not alter the allocation of their risk assets, this will reduce bank financing of corporate investment. But, that statement involves lots of “ifs,” none of which might hold. With more capital, the incentives of banks could improve, leading to a more

efficient allocation of risky assets with positive ramifications on growth. And, householders and other savers might reduce their investments in government bonds and increase their financing of corporate investments through other intermediaries and markets that more effectively screen and monitor those firms, with positive growth effects. Thus, as countries increase their capital regulations to build bigger “cushions,” each country needs to consider how these reforms will affect the incentives of bank decision makers and whether other mechanisms are available to finance growth.⁵

IV. Conclusions

The incentives shaping the decisions of financial institutions exert a profound impact on economic growth. Primarily by influencing the allocation of capital, financial systems help determine long-run rates of economic growth, the distribution of income, and the degree of poverty.

Financial regulation plays a key role in shaping the incentives of financial institutions, so that improving financial sector policies is vital for promoting economic growth. Financial regulation is not just about preventing the next financial crisis. It is about encouraging, and indeed permitting, improvements in living standards, especially for those at the lower end of the distribution of income.

A central finding about financial regulation is that the same regulation has different effects on the functioning of financial intermediaries depending on national institutions

⁵ Given the focus on capital regulations, which are sometimes viewed as a panacea, it is worth stressing that more capital will not necessarily improve the governance and hence the capital allocation choices of banks. As an extreme, consider a bank that is 100% equity financed. If this equity is contributed by disparate, small shareholders and the corporate governance mechanisms of the banks give these small shareholders little voice, then the bank’s capital allocation decisions will reflect the interests of executives, which may or may not lead to desirable investments from the perspective of the bank’s owners or society at large.

and policies. Empowering official agencies does not improve financial sector operations if those agencies do not use their powers in the best interest of the public and instead use them to promote the interests of the financial services industry or the narrow political interests of powerful politicians. Forcing greater transparency about banks will not improve market discipline if debt holders are insured by the government or investors do not have the legal means to use that information to improve the governance of banks. And, tightening capital regulations influences the asset allocation decisions of banks in ways that depend on the comparative power of equity holders, debt holders, and executives in the corporate governance of the bank.

Though the research findings are nuanced, yielding no uniform, static checklist of growth-enhancing policies, they provide strategic lessons.⁶ Empowering official supervisors will have a much higher probability of enhancing the incentives of financial institutions and market participants if sound political and other institutions exert effective governance over these regulatory bodies. Since most countries do not have effective mechanisms for governing official regulatory agencies, these findings raise a cautionary flag about granting these agencies even more power. Enhancing the market monitoring and discipline of banks is essential for improving the incentives of bank executives. But,

⁶ This sentiment is nicely articulated by David Leonhardt (2011), who writes “One of the tricky things about the subject is that almost nothing is certain in the way that, say, two plus two equals four. Economics — which is at root a study of human behavior — tends to be messier. Because it’s messier, it can be tempting to think that all uncertainty is equal and that we don’t really know anything.

“But we do. It’s just that the knowledge tends to come with caveats and nuances. Economic truths may not rise to the level of two plus two equals four, but they are not so different from the knowledge that the earth is round or that smoking causes cancer.

“The earth is not perfectly round, of course. Some smokers will never get cancer, while most cancer is not caused by smoking. Yet in the ways that matter most, the earth is still round, and smoking does cause cancer. Both of these facts are illustrative in another way, too: seemingly smart people spent decades denying them.”

effective market monitoring requires three mutually-dependent ingredients: incentivizing debt holders and small shareholders to monitor banks, forcing banks to disclose accurate, comparable, and easily accessible information, and creating sound institutions, so that well-incentivized and informed private investors can discipline and help govern banks. Creating a regulatory environment that produces all three components of effective market discipline is both extremely difficult and crucially important for establishing a growth-promoting financial system.

Nor is creating a sound regulatory environment a one-time job that once achieved, allows officials to relax. As economists would put it, financial regulation is a dynamic game, not a static one. The financial system is constantly innovating around existing rules, and regulators need the power—and incentives—to monitor these changes and to respond. Regulators instead have been devoting significant resources to the Basel process, which seems to take the view that one size fits and that capital requirements and supervision can make financial systems safe and sound. The absence of empirical support for these beliefs should be sufficient to persuade the authorities who are driving the Basel process that it is time not for Basel III, IV or V, but time for Basel to go back to the drawing board and rethink its strategy.

The financial reform challenges currently facing policymakers are serious and consequential. There has been a marked deterioration in the factors shaping the incentives of financial institutions in many countries, which will have adverse repercussions on economic growth. Market discipline has waned, as the “policy” of too-big-to-fail has expanded, the effects of regulations that distort the incentives and amplify the impact of credit rating agencies have become more pronounced, and the internal corporate

governance mechanisms of banks have deteriorated. And, as more responsibilities are heaped on official regulatory agencies, it is unclear whether they have either the capabilities or the incentives to properly shape the incentives of financial systems. Unless policymakers rectify the deterioration in the systems associated with providing proper incentives to banks, the current state of financial regulation could materially harm human welfare for decades to come.

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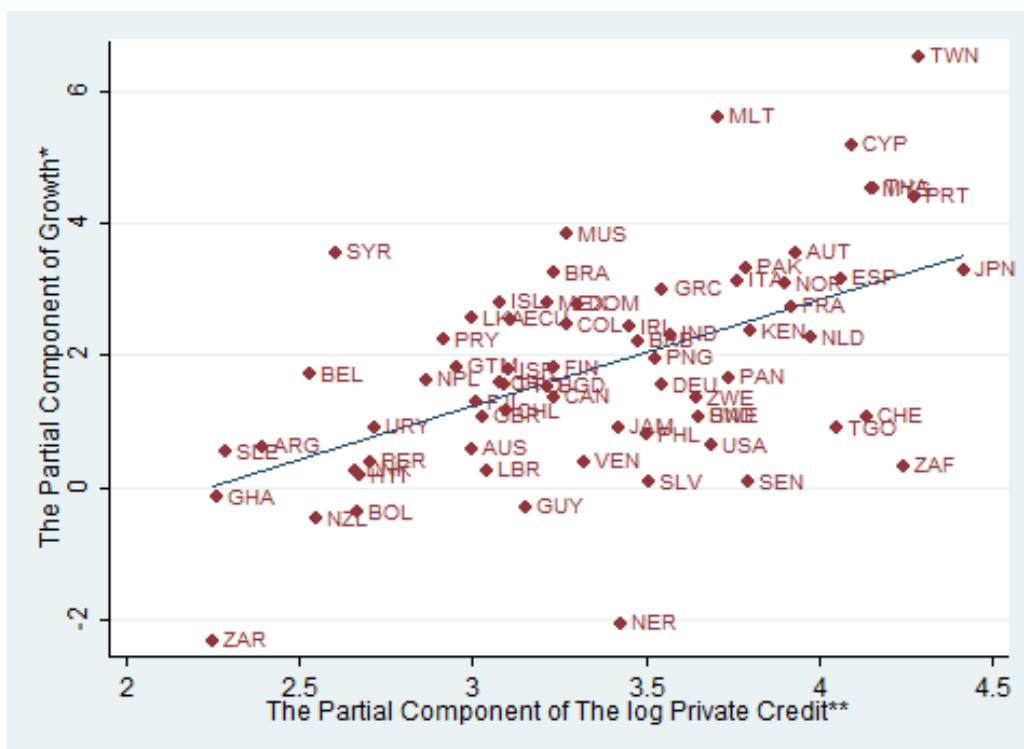


Figure 1: Growth in GDP per capita and the log of Private Credit.

Notes: This is a partial scatter plot of the regression:

$$Growth = \beta_0 + \beta_1 \text{Log}(\text{Private Credit}) + \beta_2 X + \varepsilon,$$

where *Growth* is average real GDP per capita growth over the 1960 to 1995 period, *Private Credit* is the claims on the private sector by banks and other financial institutions as a share of GDP, and *X* is a vector of the following control variables: log of initial GDP, and secondary schooling attainment in 1960. The regression includes 71 observations and the estimated coefficient, β_1 , equals 1.77, with a p-value of 0.00. To construct the figure, first regress *Growth* on *X* and collect the residuals. These residuals are called the *Partial Component of Growth*. Second, regress *Private Credit* on *X* and collect the residuals. These residuals are called the *Partial Component of Private Credit*. Finally, plot the *Partial Component of Growth* against the *Partial Component of Private Credit*. This represents the two-dimensional representation of the regression plane in Growth-Private Credit space while conditioning on *X*.

Source: Levine, Loayza, and Beck (2000) in the spirit of Table 3 Regression Set 1, which is available at http://www.econ.brown.edu/fac/Ross_Levine/Publications.htm

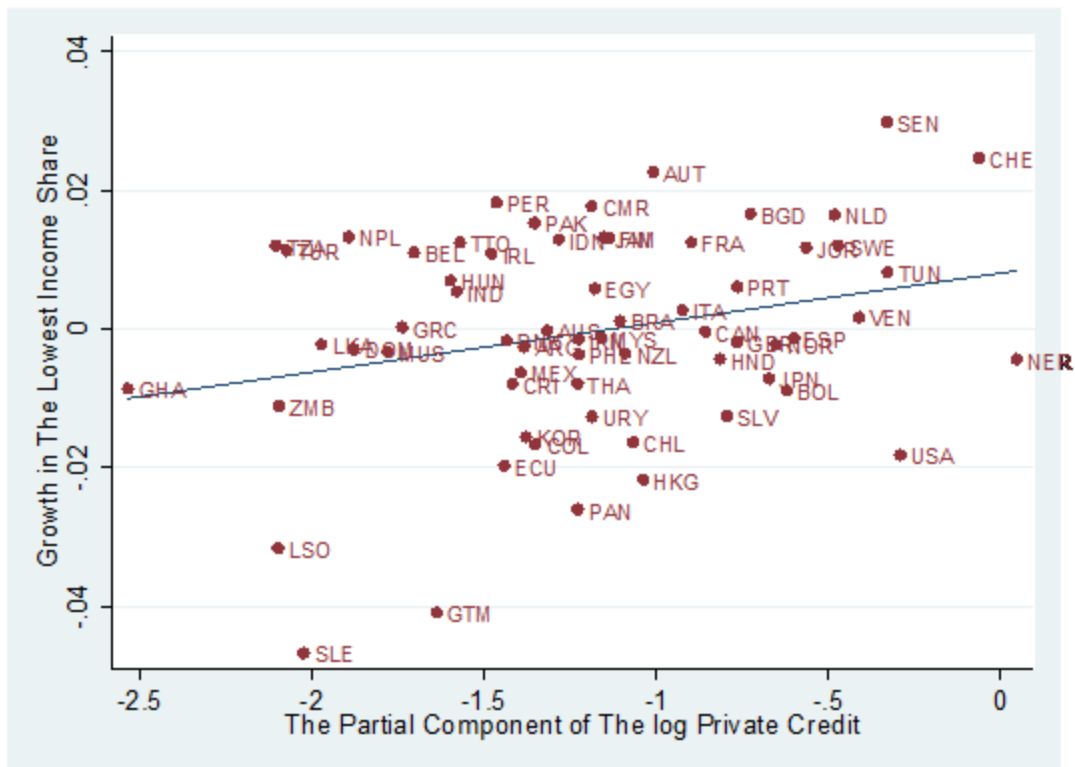


Figure 3: Growth in The log of the Lowest Income and the log of Private Credit.

Notes: This is a partial scatter plot of the regression:

$$\text{Growth in the Lowest Income} = \beta_0 + \beta_1 \text{Log}(\text{Private Credit}) + \beta_2 X + \varepsilon,$$

where *Growth in the Lowest Income* is the log of the average annual growth of the income share of the poorest quintile computed as a log difference between 1960 and 2005, *Private Credit* is the claims on the private sector by banks and other financial institutions as a share of GDP, and *X* is a vector of the following control variables: inflation, the log of exports as a fraction of GDP, log of initial Lowest Income, GDP per capita growth, and secondary schooling attainment in 1960. The regression includes 65 observations and the estimated coefficient, β_1 , equals 0.009, with a p-value of 0.014. To construct the figure, first regress *Growth in the Lowest Income* on *X* and collect the residuals. These residuals are called the *Partial Component of Growth in the Lowest Income*. Second, regress *Private Credit* on *X* and collect the residuals. These residuals are called the *Partial Component of Private Credit*. Finally, plot the *Partial Component of Growth in the Lowest Income* against the *Partial Component of Private Credit*. This represents the two-dimensional representation of the regression plane in Growth in the Lowest Income -Private Credit space while conditioning on *X*.

Source: Beck Demirgüç-Kunt and Levine (2007) Table 3 Regression 3, which is available at http://www.econ.brown.edu/fac/Ross_Levine/Publications.htm.

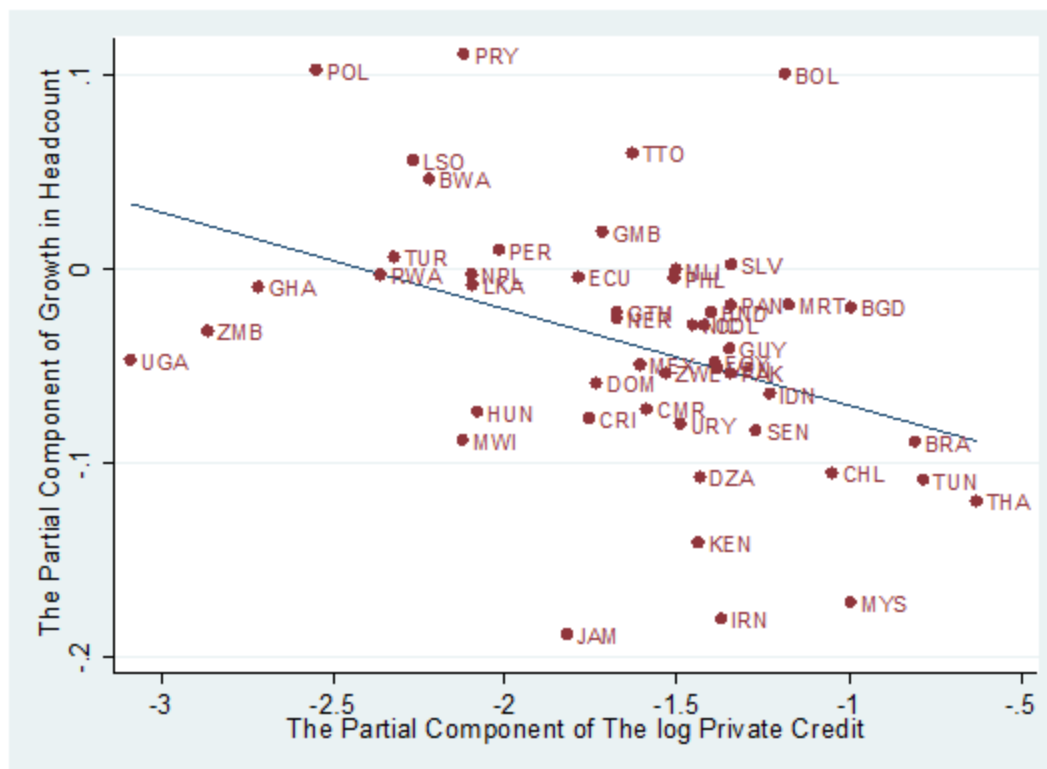


Figure 4: Growth in Headcount and the log of Private Credit.

Notes: This is a partial scatter plot of the regression:

$$Growth\ in\ Headcount = \beta_0 + \beta_1 \text{Log}(Private\ Credit) + \beta_2 X + \varepsilon,$$

where *Growth in Headcount* is the growth rate of the percentage of the population living below \$1 dollar per day, *Private Credit* is the claims on the private sector by banks and other financial institutions as a share of GDP, and *X* is a vector of the following control variables: inflation, the log of exports as a fraction of GDP, government effectiveness, initial Poverty Gap, Population Growth, Growth in mean income and secondary schooling attainment in 1960. The regression includes 51 observations and the estimated coefficient, β_1 , equals -0.050, with a p-value of 0.009. To construct the figure, first regress *Growth in Headcount* on *X* and collect the residuals. These residuals are called the *Partial Component of Growth in Headcount*. Second, regress *Private Credit* on *X* and collect the residuals. These residuals are called the *Partial Component of Private Credit*. Finally, plot the *Partial Component of Growth in Headcount* against the *Partial Component of Private Credit*. This represents the two-dimensional representation of the regression plane in Growth in The Poverty Gap -Private Credit space while conditioning on *X*.

Source: Beck Demirgüç-Kunt and Levine (2007) Table 4 Regression 3, which is available at http://www.econ.brown.edu/fac/Ross_Levine/Publications.htm

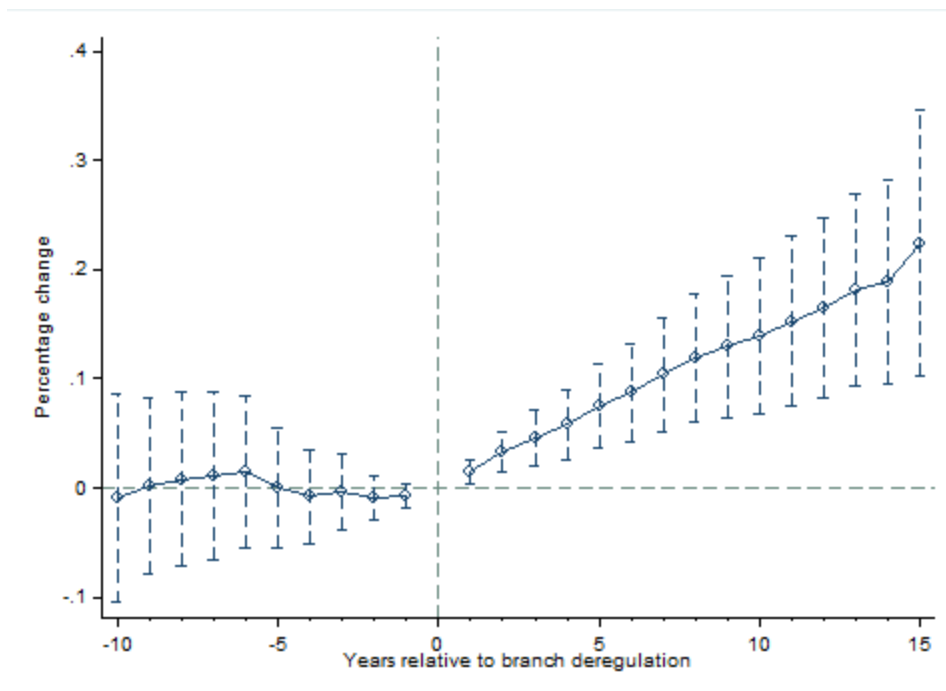


Figure 5. The Dynamic Impact of Deregulation on the Gross State Product.

The figure plots the impact of intrastate bank deregulation on per capita Gross State Product (2000 dollars). First we de-trend the Gross State Product per capita data subtracting out the mean and time trend before deregulation. We then consider a 25 year window, spanning from 10 years before deregulation until 15 years after deregulation. The dashed lines represent 95% confidence intervals, adjusted for state-level clustering. Specifically, we report estimated coefficients from the following regression:

$$\log(\text{GSP})_{st} = \alpha + \beta_1 D^{-10}_{st} + \beta_2 D^{-9}_{st} + \dots + \beta_{25} D^{+15}_{st} + \mathbf{A}_s + \mathbf{B}_t + \varepsilon_{st}$$

The D 's equal zero, except as follows: D^{-j} equals one for states in the j^{th} year before deregulation, while D^{+j} equals one for states in the j^{th} year after deregulation. We exclude the year of deregulation, thus estimating the dynamic effect of deregulation on the Gross State Product relative to the year of deregulation. \mathbf{A}_s and \mathbf{B}_t are vectors of state and year dummy variables that account for state and year fixed effects, respectively.

Source: Beck Levine and Levkov(2010), which is available at http://www.econ.brown.edu/fac/Ross_Levine/Publications.htm

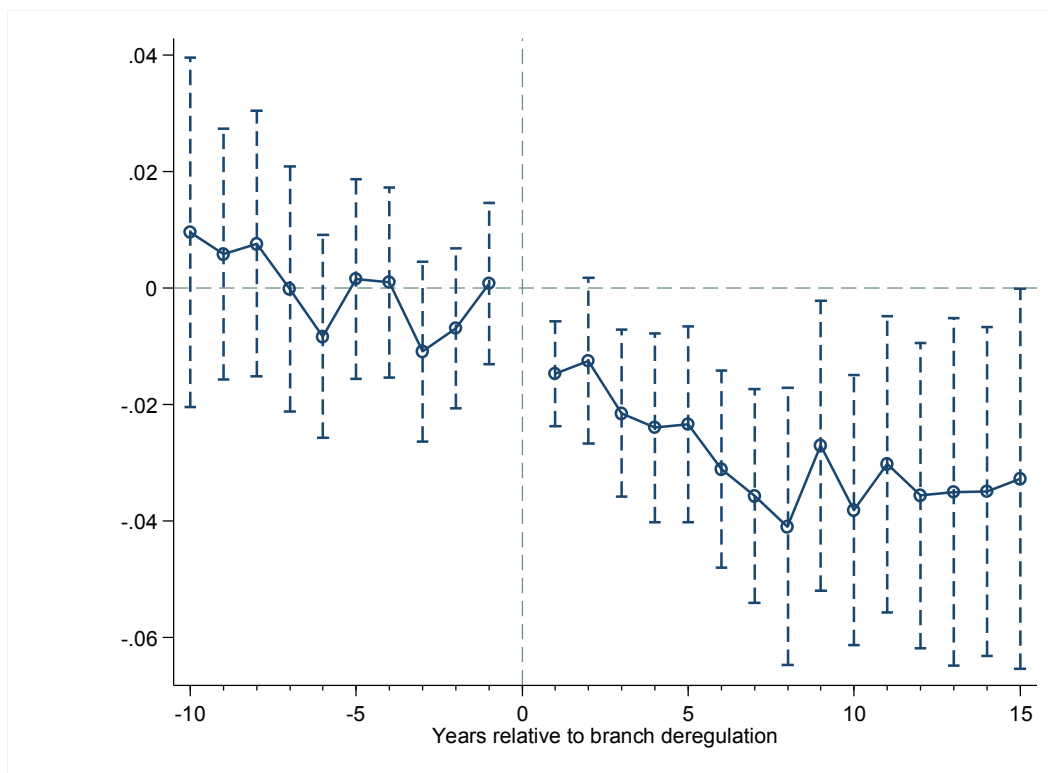


Figure 6. The Dynamic Impact of Deregulation on Gini Coefficient of Income Inequality.

The figure plots the impact of intrastate bank deregulation on the natural logarithm of the Gini coefficient of income inequality. We consider a 25 year window, spanning from 10 years before deregulation until 15 years after deregulation. The dashed lines represent 95% confidence intervals, adjusted for state-level clustering. Specifically, we report estimated coefficients from the following regression:

$$\log(\text{Gini})_{st} = \alpha + \beta_1 D^{-10}_{st} + \beta_2 D^{-9}_{st} + \dots + \beta_{25} D^{+15}_{st} + \mathbf{A}_s + \mathbf{B}_t + \varepsilon_{st}.$$

The D 's equal zero, except as follows: D^{-j} equals one for states in the j^{th} year before deregulation, while D^{+j} equals one for states in the j^{th} year after deregulation. We exclude the year of deregulation, thus estimating the dynamic effect of deregulation on the different percentiles of income distribution relative to the year of deregulation. \mathbf{A}_s and \mathbf{B}_t are vectors of state and year dummy variables that account for state and year fixed effects, respectively.

Source: Beck Levine and Levkov(2010), which is available at http://www.econ.brown.edu/fac/Ross_Levine/Publications.htm

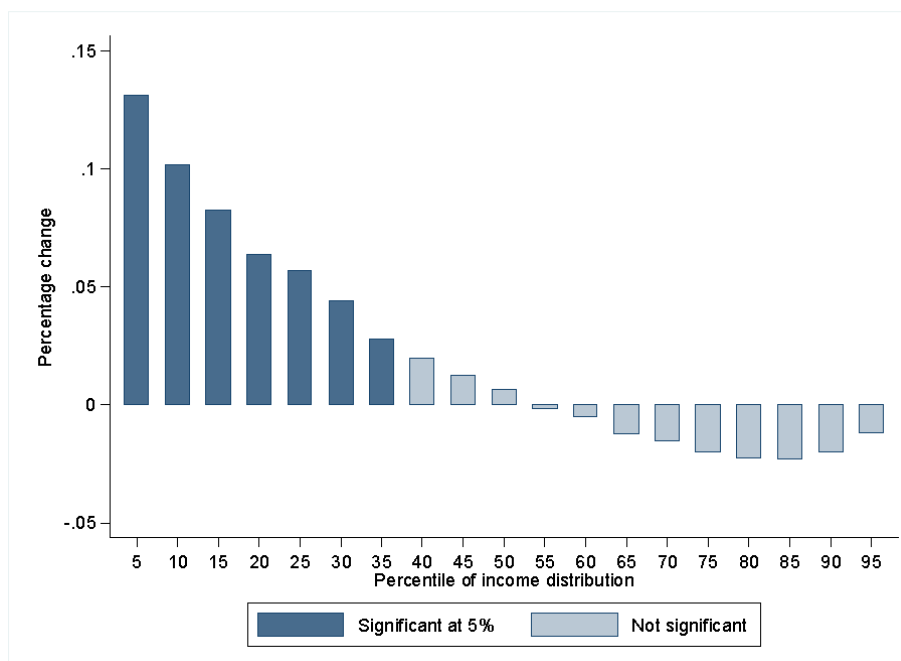


Figure 7: The Impact of Deregulation on Different Percentiles of Income Distribution.

Each bar in the figure represents the estimated impact of bank deregulation on a natural logarithm of a specific percentile of income distribution. Dark bars represent estimates significant at 5% after adjusting the standard errors for clustering. Light bars represent statistically insignificant estimates. Specifically, we report the estimates of γ from 19 separate regressions of the following form:

$$Y(i)_{st} = \alpha + \gamma D_{st} + A_s + B_t + \varepsilon_{st}$$

where $Y(i)_{st}$ is the natural logarithm of i th percentile of income distribution in state s and year t . D_{st} is a dummy variable which equals to zero prior to bank deregulation and equals to one afterwards. A_s and B_t are vectors of state and year dummy variables that account for state and year fixed effects, respectively. Each of the 19 regressions has 1,519 observations corresponding to 49 states (we exclude Delaware and South Dakota) times 31 years between 1976 and 2006.

Source: Beck Levine and Levkov(2010) Figure 2, which is available at http://www.econ.brown.edu/fac/Ross_Levine/Publications.htm

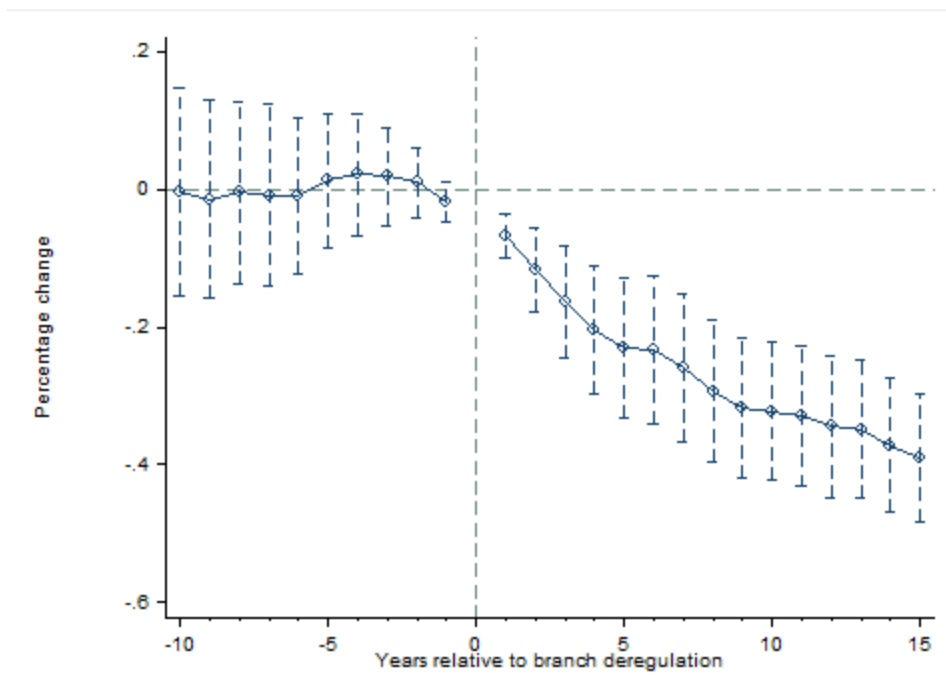


Figure 8: The Dynamic Impact of Deregulation on the Unemployment rate.

The figure plots the impact of intrastate bank deregulation on Unemployment. At first we de-trend Unemployment by subtracting out the mean and time trend before deregulation. We then consider a 25 year window, spanning from 10 years before deregulation until 15 years after deregulation. The dashed lines represent 95% confidence intervals, adjusted for state-level clustering. Specifically, we report estimated coefficients from the following regression:

$$\log(\text{Unemployment})_{st} = \alpha + \beta_1 D^{-10}_{st} + \beta_2 D^{-9}_{st} + \dots + \beta_{25} D^{+15}_{st} + \mathbf{A}_s + \mathbf{B}_t + \varepsilon_{st}.$$

The D's equal zero, except as follows: D^j equals one for states in the j^{th} year before deregulation, while D^{+j} equals one for states in the j^{th} year after deregulation. We exclude the year of deregulation, thus estimating the dynamic effect of deregulation on Unemployment relative to the year of deregulation. \mathbf{A}_s and \mathbf{B}_t are vectors of state and year dummy variables that account for state and year fixed effects, respectively.

Source: Beck Levine and Levkov(2010), which is available at http://www.econ.brown.edu/fac/Ross_Levine/Publications.htm