

Regulation, Scale, and Growth: Evidence from the United States and India

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Abstract: This dissertation offers insight into the effect of regulation on various aspects of growth and development. Exploiting plausibly exogenous variation generated by deregulatory events, I assess firms' response to the lifting of size restrictions. In Chapter One, I show that bank branching deregulation increased mortgage lending and homeownership, especially among marginal groups. In Chapter Two, I find that the dismantling of an Indian business regulation constraining investment leads to an increase in firm size, output and productivity.

Category: Economics, Development, Growth, Banking

Keywords: Natural Experiment, Difference-in-Differences, Homeownership, Productivity, Misallocation

Executive Summary

Overview

Chapter One explores the consequences, particularly the distributional consequences, of financial regulation on access to mortgage credit and homeownership in the United States. From the 1970s to the early 1990s, most states in the U.S. lifted regulations that restricted the ability of commercial banks to open branches within the state. Branching deregulation represents an important episode of financial development, and presents a quasi-experimental setting to explore the question of whether improvements in credit markets disproportionately benefit certain groups. Exploiting cross-state and cross-time variation in branching, and piecing together several micro-level datasets on mortgages and banks, I find an increase in overall homeownership and mortgage lending. These effects are strongest for the middle quantiles of the income distribution, as well as for black households and younger households. Down payments, which tend to be the binding constraint for new homeowners, decrease as well. These results are driven only by commercial banks, the specific financial institutions subject to the policy. Despite the expansion of credit to marginal borrowers, there are no increases in foreclosures following deregulation. Further evidence suggests that the expansion of branch networks allowed banks to exploit economies of scale and invest in screening technologies, enabling faster and more accurate assessment of borrower risk, and ultimately allowing lenders to extend credit to previously excluded borrowers. The findings in this chapter are not only useful for thinking about deregulation and bank expansion, but also about the distributional effects of regulation in general. Policymakers' redistributive motives frequently drive regulation but the results of these policies often end up with the opposite result. For example,

pro-debtor institutions tend to be associated with populist political agenda. An illustration of this is the originations of borrower-friendly features associated with foreclosure processes which can be traced back to the Great Depression when politicians faced strong anti-creditor sentiment from the public. But if restricting creditor rights raises the cost and reduces the supply of credit, it might disproportionately hurt the poor who are less likely to have access to other sources of funds. The origins of branching regulation are also rooted in politicians' fear of large, monopolistic banks that would help the wealthy at the expense of the poor. However, the results here show that in fact branching hurt homeownership in the lower end of the socioeconomic spectrum.

The second chapter, set in the India context, examines how policies that restrict firm size hamper manufacturing productivity. The work is motivated by the observation that the firm size distribution in less-developed countries is dominated by small firms. This may reflect the misallocation of resources arising from distortionary policies and institutions. In this work, I assess one important class of potentially distortionary policies-- government support for small enterprises. India's product reservation policy presents a unique quasi-experimental setting to estimate the impact of this type of government regulation on the manufacturing sector. The policy mandated that certain products were "reserved" for manufacture by small firms specifically, those with capital below a certain threshold. Since 1997, this investment ceiling has been removed for different products at different times. Exploiting variation in the choice and sequencing of goods subject to this "dereservation," I find that firm productivity increases by 3% and output increases by 5% once size restrictions are lifted. The effects are disproportionately higher for industries with larger economies of scale, and for states where institutions make it easier for firms to increase size. Probing further into the channels behind this effect, I find that although productivity increases across most of the industry firm size distribution, bigger firms grow disproportionately more both in terms of productivity and size. Additionally, the concentration of market share increases following the policy. There is no change in the rate of new entry and new entrants are not disproportionately larger or more productive. These results suggest that older, larger incumbents expand and move into the production of these once-forbidden items when size restrictions are removed. This finding that productivity in the manufacturing sector because firms did not expand ties into a pressing question in the field: is the scale of economic activity, whether defined in terms of the size of enterprises or agricultural plots or microfinance loans-- too small? And if it is, why is this the case?

In sum, both the chapters present strong empirical evidence that regulations can constrain firms from growing and exploiting their economies of scale, with significant impacts on credit and

productivity. The consequences of this effect is explored on two different outcomes and in two different economies. This feature, along with the strength of the research design, makes a compelling argument against the statement that small is always beautiful.

Chapter One-- Home Sweet Home: Financial Development and Asset Inequality

There is broad consensus on the role of well-developed financial markets and intermediaries in boosting overall economic growth. A vast body of research documents that by easing information, enforcement and transaction costs, a properly functioning financial sector improves the overall allocation of resources. However, the distributional implications of financial development are much less clear.

Improvements in screening, relaxation of collateral requirements and the reduced need for self-finance may give previously excluded individuals access to finance, and improve their economic opportunities. Decrease in income inequality in Galor and Zeira (1993) and Becker and Tomes (1986) relies crucially on credit access that fosters human capital accumulation or allows the poor to become entrepreneurs (Banerjee and Newman, 1993). Financial constraints are also cornerstones in theories of persistent inequality involving local externalities as in Durlauf (1996), where lack of credit to buy a home leads to segregation among neighborhoods. Conversely, another class of models opines that improvements in financial markets manifest themselves on the intensive margin. In Greenwood and Jovanovic (1990) the emergence of financial intermediaries ameliorates information frictions and this is coupled with widening of the income gap. Lilienfeld-Toal et al. (2012) show that in the presence of inelastic credit supply, stronger enforcement of creditor rights reduces access for small borrowers and expands it for the rich. Modeling vertical ties between the formal and informal sector, Floro and Ray (1997) demonstrate that the expansion of formal credit can worsen credit terms of informal borrowers. Faced with contrasting theoretical predictions, the link between financial sector development and economic opportunity remains an empirical question and it is a motivation for the work here.¹

In this paper, I assess the distributional consequences of credit market improvements. Using a quasi-experimental setting provided by U.S. branch banking deregulation, I explore this distributional question in the context of asset inequality, specifically access to homeownership. During one of the most important chapters in U.S. financial history, branch banking deregulation removed geographic restrictions on banks' ability to open branches, representing a significant

¹ Demirguc-Kunt and Levine (2009) provide a comprehensive review of the empirical and theoretical literature on this subject

episode of financial development. Exploiting cross-state and cross-time variation in branching, and piecing together several micro-level datasets on home lending and banks, I examine the policy's impact on the nature and availability of mortgages across different populations in the United States. Specifically, I explore three questions. First, whether this policy led to an overall increase in the stock and flow of home loans. Second, whether this effect was stronger for households in a particular part of the income distribution or across different demographic groups. And lastly, I propose a particular channel underlying these effects.

From the late 1970s to the early 1990s, most states in the U.S. lifted regulations that restricted commercial banks in opening branches within the state. I use variation in the timing of deregulation across states to estimate the impact of financial development on homeownership. Studying this question in such a difference-in-differences framework is a reasonable econometric strategy because branch banking deregulation can be regarded as plausibly exogenous to a state's pre-existing mortgage market conditions. Kroszner and Strahan (1999) identify which economic and political features of a state explain its timing of branching, finding an important role for the presence of small banks but none for the structure of mortgage markets. Additionally, the data show no systematic trends in homeownership, mortgage lending or mortgage contractual terms prior to branching policy.

I implement this difference-in-differences strategy using individual-level data on homeownership, census tract-level data on mortgage lending and loan level data on credit terms. The detailed nature of the data allows me to study not only the aggregate effect of deregulation, but also the policy's impact on different sub-groups of the population differentiated by income, age or race. Besides controlling for household or individual characteristics to take care of any compositional effects over time, I also control for state characteristics that are not absorbed by state and year fixed effects i.e. those that vary over time such as economic conditions or measures of income distribution. The results, consistent with each other across all of these different data sources, show important changes in housing markets.

Following the removal of geographic restrictions on bank expansion, the flow of mortgage lending increased by 5 percent and the stock of homeownership increased by 2 percent over five years. Consistent with theories that contend that better functioning credit markets disproportionately benefit the less well-off, deregulation led to increased homeownership among marginal and poorer borrowers. The homeownership rate rose by 4.1 percent for households with incomes below the median of the income distribution, 3.7 percent for younger borrowers and 11 percent for black households over five years. The effect of deregulation on the stock and flow of mortgage loans was

strongest for the middle quantiles of the income distribution. Intuitively, this makes sense as we expect these marginal households to be more affected than the poorest ones (who are likely very far off from being able to own a home) or the richest ones (who probably already own a house). The next sets of findings pertain to loan-to-value (LTV) ratios following branching. The real estate literature provides substantial evidence that the mortgage down payment is the binding constraint for first-time homeowners (Chiuri and Jappelli, 2003). Consistent with this, I find that LTV ratios increased following deregulation. Overall, they were higher by 2% and the fraction of "high" LTV ratios (i.e. those above 80 percent) increased by 4%. For loans made by commercial banks, LTV ratios rose by 8 percent. This implies a reduction in the average down payment of \$7000-\$9000. A noteworthy point about these effects is that they are driven by commercial banks as opposed to savings and loans (S&Ls) and mortgage banks. Commercial banks were the only financial institutions subject to the policy, so this finding reinforces the causal link between deregulation and mortgage market effects.

A natural question, especially given recent economic events, is whether expansion of credit to riskier borrowers led to adverse outcomes in mortgage markets. However, I do not find any change in loans past due, foreclosures or delinquencies following branch deregulation. This evidence weighs in against the argument that heightened competition was prodding banks to expand their lending to new and riskier borrowers.

Next, I propose a possible channel linking branching deregulation and increased access to mortgage credit---adoption of new screening technologies by commercial banks. As has been extensively discussed in the banking literature, the removal of geographic restrictions on banks altered market structure dramatically by intensifying competition and consolidation. Placing my findings alongside these well-documented post-branching effects, I suggest that coupled with the threat of entry, the expansion of branch networks allowed banks to exploit economies of scale and invest in new technologies. Some of these new technologies such as electronic links to credit bureaus, automated underwriting, artificial intelligence software, automated appraisals of home and credit scoring enabled lenders to assess borrower credit risk faster and more accurately. The result was increased mortgage access for a particular segment of marginal borrowers, specifically those who were good credit risks but constrained by initial wealth.

An empirical investigation of this channel yields highly suggestive results. My first proxy for technology adoption is standard deviation of the interest rate. There was an increase in the dispersion of the mortgage loan price following branching. This is consistent with usage of risk-based pricing technology which allows lenders to tailor the interest rate more precisely to

individual characteristics of borrowers. The second proxy is lending productivity (number of mortgage loans per employee). This measure increased by 5 percent following deregulation, providing evidence for the rising usage of computers and automated algorithms in loan screening and assessment. Moreover, the effect is magnified for banks with more branches, suggesting that increases in scale due to branching were conducive to investments in these new technologies. The absence of data with detailed measures of technology adoption from this period precludes an iron-clad argument linking the robust mortgage expansion I observe to technology adoption. Nevertheless, the proxies highlight a novel and intriguing channel shaping the distributive consequences of changing market structure. They also provide fodder for thinking about the impact of emerging technologies on banking access.

Further tests undermine support for alternative channels. Beck et al. (2010) show that intrastate branching deregulation led to a tightening of the income distribution by increasing the relative wages of households in the lower end of the income distribution. So, it could be that branching caused higher homeownership by increasing the purchasing power of poorer households rather than by affecting the functioning of the banking system. However, I show that this is not the case. All the results remain robust to controlling for income, inequality or state economic conditions. Additional tests using the BLL sample also casts doubts about a demand shock driving the results. Also, branching does not affect house prices or securitization, ruling these out as causes for mortgage expansion.

Rigorous empirical assessments of the finance-inequality nexus remain few. Two papers close in spirit to this one are Beck et al. (2010) and Burgess and Pande (2005). In the former, branching deregulation appears to be exogenous to income inequality and the authors show a significant reduction in income inequality post-deregulation. Burgess and Pande (2005) exploit a natural experiment in India's bank branching policy to show that opening of new branches lowered poverty. Even though these two papers present credible identification strategies, they are not able to a) relate branching to a direct product of banking (e.g. loans) but instead to more general distributional measures and b) provide intuition for mechanisms underlying their results. In contrast, I focus on a particular product of the banking system—mortgage loans, and shed light on one facet of financial development-- reduction of information asymmetries. Two other papers demonstrate the importance of financial markets in determining who gets a home. Gerardi et al. (2010) measure mortgage market imperfections by the inability of households, especially marginal borrowers, to buy homes consistent with their long-term income prospects. They find that credit markets have become "more perfect" particularly due to increased securitization activity. In a

cross-country study, Chiuri and Jappelli (2003) label "required down payment ratios" across countries as "financial market imperfections" and find that this affects the distribution of owner occupancy rates across age groups, especially at the young end. But these and most other papers are unable to make a convincing case for causality running from improvements in the financial system to distributional outcomes. In contrast, I provide various pieces of evidence showing that branching may be regarded as a plausibly exogenous case of financial development.

Chapter 2-- Is Small Beautiful? Evidence from India's Product Reservation Policy for Small Industry

The preponderance of small firms in less-developed countries is striking. In India, the median firm size is three workers whereas in the United States it is forty-eight (Hsieh and Klenow, 2011). In Ghana, less than fifteen percent of firms employ more than ten workers while in the United States, manufacturing establishments with fewer than five employees accounted for less than one percent of the value added in 1997, while firms with more than 500 employees accounted for almost half the value added (Gollin, 2009). An influential body of mostly theoretical work suggests that the firm size distribution, especially the thick left tail, in less-developed countries reflects the misallocation of resources in the economy, arising from distortionary policies and institutions (Hsieh and Klenow, 2009). Some examples of these are credit market imperfections, corruption, contracting frictions, and differential enforcement of regulation.

In this paper, I assess one important class of potentially distortionary policies-- government support for small enterprises. Such policies are ubiquitous. The Korean Credit Guarantee Fund and Argentina's Regimen de Bonificacion de Tasas provide credit support in the form of guarantees and interest rate subsidies. In Indonesia, the Bapak Angkat program provides a whole slew of financial, fiscal, and technical help for small-scale enterprises (SSEs, also called small and medium enterprises or SMEs). The UK's Capital for Enterprise program backs venture capital funds that invest in small enterprises. As of July 2010, the World Bank had active commitments of \$2.5 billion for SSEs. Is the special treatment of small firms economically efficient or does it lead to market distortions and misallocation of resources? Given the large amounts of resources dedicated to assisting SSEs, there is surprisingly little rigorous empirical research on this question. Drawing a causal link between intensity of a country's small-scale production and economic outcomes is challenging because unobserved factors e.g. institutions may be driving both variables, confounding analysis. For example, inept governments are likely to drive both, poor economic growth as well as ineffective SSE subsidization programs. This would lead one to erroneously conclude that there is a

causal link between SSE support and economic growth. Existing empirical evidence lacks credible identification strategies to mitigate this problem.

I attempt to fill this gap in the empirical literature by studying an important Indian policy--- product reservations. For decades, the Indian government mandated that certain products, ranging from food items to chemicals, numbering over 800 and constituting almost 25 percent of manufacturing output, would be reserved for exclusive manufacture by small-scale enterprises.² Starting in 1997, this regulation has been dismantled gradually, with different products being taken off the "reserved list" or being dereserved at different times. Reservation policy was part of the "troika" of major industrial policies which included trade liberalization and industrial licensing. These two were eliminated much before dereservation and have been extensively studied in the economics literature. Product reservations, however, have not yet been analyzed. In this paper, I exploit plausibly exogenous variation in the timing and choice of dereservation of products to estimate the causal impact of SSE support (or more precisely, the withdrawal of SSE support) on economic productivity. This difference-in-differences methodology is implemented using annual, detailed factory-level data from the Annual Survey of Industries (ASI).

I find that a one percentage point increase in an industry's share of unreserved output boosts productivity by .001%. Over the sample period, the share of unreserved output rose by 20 percentage points suggesting an increase in productivity by around 3%. There is also an increase in firm size as measured by output, employment or capital by 5%, suggesting that removing the investment ceiling allows firms to expand and exploit economies of scale. In order to confirm whether the scale effect is an important driver of the productivity effects, I also study whether the impact varies by an industry's capital intensity. Using the United States industry structure as the benchmark, I test whether dereservation has heterogeneous impacts on industries which are "naturally" composed of smaller firms. Indeed, the productivity and size of firms increases after dereservation, but disproportionately more for industries where firms should be larger. For example, in the U.S., industries like chemicals tend to have larger firms. Here I find that the removal of size constraints has a disproportionately larger impact, almost ten times higher, than in the wood products industry where technology dictates a smaller share of large firms. I also find that the increase in growth and productivity following dereservation also varies by the firm's

² In India the current definition of "Micro, Small and Medium" firms is Micro: <Rs. 25lakh (\$55K), Small: Rs. 25 lakh-5 crore (\$1 million) and Medium: Rs. 5 crore-Rs. 10 crore (\$2 million) of investment in plant and machinery. This definition was instated in 2006 before which there was only one category of "Small" firms with investment less than Rs. 100 lakh (\$200K)

institutional environment. In states where industrial regulations favor the firing of workers by employers thus enabling easier adjustment of firm size, firms grow 6% for the 20 percentage point increase in unreserved output compared to "pro-worker" states where the change is statistically insignificant from zero. Probing further into the channels behind this effect, I find that although productivity increases across most of the industry firm size distribution, bigger firms grow disproportionately more both in terms of productivity and size. Also, the HHI, which measures the concentration of market share increases after the policy. There is no change in the rate of new entry into the industry and new entrants are not disproportionately larger or more productive. These results suggest that older, larger incumbents expand and move into the manufacture of products once they are dereserved.

References

- Banerjee, Abhijit V. and Andrew F. Newman, "Occupational Choice and the Process of Development," *Journal of Political Economy* 101 (1993): 274-298.
- Beck, Thorsten, Ross Levine and Alexey Levkov, "Big Bad Banks? The Winners and Losers from Bank Deregulation in the United States," *The Journal of Finance*, 65 (2010): 1637-1667.
- Becker GS, Tomes N. "Human capital and the rise and fall of families," *Journal of Labor Economics* 4(1986), S1-39
- Burgess, Robin and Rohini Pande, "Do Rural Banks Matter? Evidence from the Indian Social Banking," *American Economic Review* 95 (2005), 780-795.
- Chiuri, Maria Concetta, Tullio Jappelli, "Financial market imperfections and home ownership: A comparative study," *European Economic Review* 47 (2003), 857-875.
- Demirguc-Kunt, Asli and R. Levine," Finance and Inequality: Theory and Evidence," *Annual Review of Financial Economics* 1 (2009), 287-318.
- Durlauf Steven N, "A Theory of Persistent Income Inequality," *Journal of Economic Growth* 1(1996):75-93
- Floro, Maria Sagrario and Debraj Ray, "Vertical Links Between Formal and Informal Financial Institutions," *Review of Development Economics* 1 (1997), 34-56.

Galor, Oded and Joseph Zeira, "Income Distribution and Macroeconomics", *Review of Economics and Statistics* 60 (1993), 35-52.

Gerardi, Kristopher S., Rosen, Harvey S. and Willen Paul S. "The Impact of Deregulation and Financial Innovation on Consumers: The Case of the Mortgage Market," *Journal of Finance* 65 (2010), 333-360.

Gollin, Douglas, 2006, Do Taxes on Large Firms Impede Growth? Evidence from Ghana, *mimeo*.

Greenwood, Jeremy, and Boyan Jovanovic. "Financial Development, Growth, and the Distribution of Income," *Journal of Political Economy* 98 (1990): 1076-107.

Hsieh, Chang-Tai and Peter J. Klenow, 2009, Misallocation and manufacturing TFP in China and India, *Quarterly Journal of Economics* 124, 1403-1448.

Kroszner, Randall and Philip Strahan, "What Drives Deregulation? Economics and Politics of the Relaxation of Bank Branching Deregulation," *Quarterly Journal of Economics* 114 (1999), 1437-67.

Von Liliendorf-Toal, Ulf, Dilip Mookherjee and Sujata Visaria, "The Distributive Impact of Reforms in Credit Enforcement: Evidence from Indian Debt Recovery Tribunals," *Econometrica* 80 (2012), 497-558.