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Banking Deregulation, Financing Constraints and Entrepreneurship

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Banking Deregulation, Financing Constraints and Entrepreneurship*

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Abstract

We study how U.S. branch banking deregulations affected the entry of new firms in the non-financial sector using establishment-level data from the U.S. Census Bureau's Longitudinal Business Database. The comprehensive micro-data allow us to study how both the entry rate and the distribution of entry sizes for new startups responded to changes in banking competition. Moreover, we distinguish the relative effect of the policy reforms on the entry of startups compared to the opening of new establishments by existing firms. We find interstate banking deregulations had a strong positive effect on the birth of new firms relative to the facility expansions of existing firms. We find limited evidence that the intrastate banking deregulations influenced entry. Our results have implications for existing theories of financial constraints for entrepreneurs, as well as research looking at the effect of banking competition on the efficient allocation of capital.

JEL Classification: E44, G21, L26, M13.

Key Words: banking, financial constraints, entrepreneurship, entry, deregulation.

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1 Introduction

What effect does an increase in banking competition have on the entry of startups? In particular, does an increase in banking competition have a differential effect on the entry of startups relative to the opening of new establishments by existing firms?

The theoretical literature highlights two distinct, and opposing, predictions for how increases in competition in the banking industry may affect entrepreneurship relative to the expansion of existing firms. First, increases in bank competition may lower interest rates for potential borrowers and allocate capital more efficiently across projects (e.g., Erel 2006; Cetorelli 2004). Startups are especially dependent on banks for financing entry, being the primary source of external finance available to most entrepreneurs (e.g., Fluck et al. 1998). If potential entrepreneurs face greater financing constraints relative to existing businesses, growth in bank competition could have a stronger effect on the entry of startups relative to the expansion of existing firms. This greater allocative efficiency through competition is a familiar argument for breaking up monopolies.

On the other hand, several studies highlight that concentrated banking markets may in fact be good for entrepreneurship. Banks with local monopoly power can engage in inter-temporal cross-subsidization of credit. These banks charge startup firms below-market interest rates when they are young and financially constrained; the banks later compensate for these losses by charging above-market rates when the startups mature. In addition, the local monopolies give banks more incentive to engage in relationship banking and to process 'soft' information about potential borrowers. As startups have fewer assets that can be pledged for loans, both of these institutional factors benefit potential entrepreneurs relative to existing firms (e.g., Rajan and Petersen 1994, 1995; Berger and Udell 1995). This second perspective suggests that an increase in banking competition may in fact hurt potential entrepreneurs.

Despite these theoretical relationships between banking competition and entrepreneurship, there are few empirical studies that directly examine the entry patterns of firms in non-financial sectors and how these entry patterns are affected by changes in the provision of finance. This is due in part to the difficulty in assembling data on entering firms, and the bulk of the empirical literature focuses on how banking competition affects existing firms. This study helps fill this gap and provides evidence on which of these theoretical drivers best explains the relationship between banking competition and entrepreneurship.[1]

[1]Most of the research examining financing constraints on firm-level outcomes focuses on established firms (e.g., Banerjee and Duflo 2004; Fazzari et al. 1988; Kaplan and Zingales 1997, 2000; Paravisini 2005). Other studies consider financing constraints and the entry of individuals into entrepreneurship (e.g., Evans and Jovanovic 1989; Gentry and Hubbard 2000; Hurst and Lusardi 2004). Relatively few studies examine the effect of financing constraints on the entry of new businesses, either directly or indirectly through the firm size distribution. See Black and Strahan (2002), Cabral and Mata (2003), Cetorelli and Strahan (2006), Bertrand et al. (2006), and Zarutskie (2006).

We study the entry of newly incorporated businesses using detailed establishment-level data collected by the U.S. Census Bureau. Our data provide annual observations on every private-sector establishment in the U.S. from 1976 to 1999. The longitudinal nature of these data allow us to determine the entry dates of new establishments and to separate these new establishments into new startups versus additional facilities being opened by existing firms. We can therefore directly examine how the pattern of entry among startups – that in general face the greatest financing constraints – compares with the establishment expansions by existing firms that possess other, and often cheaper, sources of financing to facilitate their growth. Further, because of our establishment-level micro data, we can also examine differences in employment size distribution of entering establishments.

There are, of course, multiple factors that differentially impact the entry patterns of these two types besides dependence on bank financing. We therefore use cross-state and cross-time variation in the passage of branch banking deregulations to study how the reduction in the monopoly power of local banks affected the relative entry rates and entry size distributions of new establishments. The U.S. branch banking deregulations provide a useful laboratory for studying how banking competition affects small businesses. Prior to 1970, all but 12 states had stringent restrictions on the ability of banks to open new branches or to acquire the branches of other banks within the state; moreover, cross-state branching was universally prohibited. These restrictions created virtual monopolies in each local banking market.

Beginning in the 1970s and until 1994, all but two states removed these restrictions on the ability of banks to set up branches. One set of reforms allowed greater competition between banks that were incorporated within a given state. We refer to these as the intrastate branch banking deregulations. Another set of reforms allowed banks to expand across state borders. We refer to these as the interstate branch banking deregulations. Because these restrictions were removed across different states at different points in time, they provide us with a good opportunity to test how changes in the provision of finance due to the deregulations affected the entry of patterns of firms in the non-financial sector. Because we have data on multiple industrial sectors, we can further control for very detailed local economic trends and test whether these reforms had a stronger effect on startups in industries that are more dependent on external finance.

Our most comprehensive identification strategy compares the differential elasticity of firm births relative to the opening of new establishments by existing firms. By comparing startups to facility expansions, rather than firm growth through employment adjustments in existing plants, we create a baseline with similar discontinuous financing requirements. We control both for annual changes in the overall entry rates by startups versus existing firms and for aggregate entry conditions at the state-industry-year level. In these specifications, our identification strategy isolates the role of financial constraints for entrepreneurship by teasing out the differential

response of startups to changes in banking deregulations over-and-above the heightened facility expansions of existing firms.

This new empirical approach is our primary contribution to the literature. From an econometric standpoint, we control for a greater set of potential omitted variables than prior work by looking within state-industry cells. From a substantive perspective, we estimate the relative benefits for entrepreneurs in a more rigorous fashion. We also provide new evidence regarding the dynamic patterns of entry in the non-financial sectors after the banking deregulations, as well as a characterization of the expansion of banks across state borders following the reforms. Finally, our data allow us to study jointly the extensive margins (i.e., entry rates) and intensive margins (i.e., entry sizes) in a more comprehensive fashion than earlier work.[2]

We do not find a consistent effect of the intrastate branch banking deregulations on the entry of new establishments, either among startups or existing firms. However, the interstate deregulations had a strong positive effect on firm creation relative to the entry of new establishments by existing firms. Our preferred specification estimates a differential elasticity of 10%. The effect is evident in multiple sectors and is somewhat stronger in sectors that are more dependent on external finance. Moreover, we also find that the interstate banking deregulation increased the founding size of startups relative to the new establishments of existing firms. Taken together, our findings suggest that banking competition due to interstate deregulations had a positive effect on both the extensive and intensive margins of entrepreneurship — higher rates of firm entry and larger founding sizes for new ventures (after accounting for changes in entry rates).

These results suggest that startups face greater financing constraints relative to the benchmark of existing firms. They also highlight that increased competition in the banking industry can have positive net consequences for both the entry and expansion of financially-constrained firms, even if the possible declines in loan cross-subsidization and relationship banking individually hurt entrepreneurship. Our results complement prior research examining the relationship between banking structure and lending to existing small businesses (e.g., Rajan and Petersen 1994; Berger and Udell 1995). Although the theory is ambiguous as to whether concentrated banking markets are good for entrepreneurship, our results support the view that more competitive banking markets have a positive effect on small, financially constrained firms (e.g., Erel 2006; Berger et al. 2005; Black and Strahan 2002; Cetorelli and Strahan 2006).

Further, this paper sheds light on a possible reason why studies regarding the effects of banking competition on small businesses have had somewhat contradictory results. Consistent with the literature documenting a fall in credit extended to small businesses in the early 1990s, we also find a dip in startup activity over that period (e.g., Berger et al. 2001; Zarutskie 2006).

[2] On a more mundane level, having the universe of entering firms facilitates more comprehensive parameter estimates of the impact of banking deregulations for establishment entry.

Indeed, we further document how the relative growth of startups has lagged behind the growth of establishment openings by existing firms since the late 1970s. However, the implications of our panel estimations are that the increase in banking competition dampened national declines in startup entry in states that deregulated interstate branch banking relative to states that did not. This result, highlighting the importance of banking competition for startup entry in the face of financial-sector downturns, is a particularly interesting factor that warrants further investigation.

Finally, our findings are relevant to the developing empirical literature documenting how reforms to the banking sector may positively impact the real economy through the reallocation of resources in non-financial sectors (e.g., Bertrand et al. 2006; Cetorelli and Strahan 2006). Our study provides evidence of a mechanism through which better functioning capital markets affect the strength of entrepreneurship in local economies, namely the structure and organization of the banking industry. This mechanism has been posited as a factor that might explain why countries with better developed financial markets experience higher rates of entrepreneurial activity and hence economic growth (e.g., King and Levine 1993a, 1993b; Rajan and Zingales 2003) but until recently, had largely been tested across countries rather than within.[3]

The rest of the paper is structured as follows. In Section 2, we provide a more detailed description of the theoretical considerations and our empirical approach. In Section 3, we introduce the Longitudinal Business Database (LBD) and document aggregate trends in the rate of startup activity versus the operations of existing firms. We report our panel estimation results on the entry rates and entry sizes of new establishments in Section 4. Sections 3 and 4 also provide new evidence from the LBD regarding changes in banking structure following the deregulations. In Section 5, we conclude our study by identifying further how our results fit into the literature and the areas for future research.

2 Theoretical Considerations and Estimation Design

Our approach to studying the effect of changes in banking competition on entrepreneurship is to exploit cross-state variation in the timing of branch-banking deregulations in the U.S. The 1970s through the mid 1990s experienced a significant liberalization in the ability of banks to establish branches and to expand across state borders (either through new branches or acquisitions). Prior to these liberalizations, banks faced multiple restrictions on geographic expansion both within and across states.

[3]See Jayaratne and Strahan (1996), Levine (1997), Rajan and Zingales (1998), Laeven (2000), Beck et al. (2000), and Beck and Levine (2002).

The McFadden Act of 1927 required national banks to obey state-level restrictions on branching, effectively prohibiting the expansion of banks across state borders. In addition, many states developed stringent rules governing the conduct of branch banking within their territories. The most restrictive of these, known as unit banking, limited each bank to a single branch. Although banks responded to these restrictions by forming multibank holding companies (MBHCs) that owned more than one bank in states that imposed unit banking, states in turn restricted the activities of MBHCs. Restrictions on intrastate branching for MBHCs focused on the market share and concentration of these holding companies, while the Douglas Amendment of 1956 prevented a MBHC from owning banks across state borders.

As shown in the Figure 1, only 12 states had some form of intrastate branch banking deregulation prior to 1970, while no state allowed interstate branch banking. Starting in the 1970s, and especially in the 1980s, most states passed laws deregulating the restrictions on the ability of banks to open or acquire new branches. Two classes of restrictions were eased over this period. The first, related to intrastate branch banking, allowed banks to expand within the passing state either by acquiring other bank branches or by setting up new bank branches themselves. This allowed for more competition in the local banking market by breaking up effective monopolies that had been in place prior to these liberalizations.[4]

Second, interstate branch banking deregulations allowed banks to acquire branches in other states with which their 'home state' had negotiated such a bilateral agreement. This class of reforms further reduced the monopoly power of local banks, in particular due to the significant improvements in the market for corporate control (e.g., Berger et al. 2001).[5] The intrastate and interstate deregulations culminated in the Riegle-Neal Interstate Banking and Branching Efficiency Act of 1994, which overturned the McFadden Act and allowed national interstate branch banking after 1995. In effect, the Riegle-Neal Act put out-of-state banks on par with domestic banks in every state, with important implications for capital reserves and banking efficiency across the industry.[6]

The period following the liberalization of interstate branch banking led to an expansion of the large MBHCs across state borders and a significant fall in the number of small local banks. Table 1A documents aggregate changes in the banking sector taken from the LBD. The total number of banks fell by 30% from the mid 1970s to the mid 1990s. The share of large banks, defined as

[4]The intrastate branch banking deregulations consist of two elements. The first deregulation allows banks to expand within states through mergers and acquisitions. The second allows banks to open *de novo* branches. We focus on the leading edge of these intrastate reforms in this paper.

[5]The interstate deregulations may have also improved economies of scale, although Berger et al. (2001) argue that the mergers resulted in few cost savings on average.

[6]The Riegle-Neal Act opened up nationwide acquisition of banks across state lines so that a bank in any state could acquire another bank in any state, regardless of whether their respective 'home states' had negotiated an agreement allowing cross-state acquisitions. In addition, the Riegle-Neal Act allowed banks to set up new branches across state borders without the need to acquire a subsidiary bank. MBHCs were also allowed to convert their subsidiaries into branches. Kane (1996) carefully discusses the Riegle-Neal Act.

having more than 500 employees, and the share of branches controlled by large banks increased over the same period. There was also a sharp increase in the share of branches controlled by out-of-state banks, growing from 2% to 25%, suggesting a robust market for corporate control across state borders.

Our findings on the changes in the banking industry using the LBD data mirror those using bank assets rather than bank employees as a metric for bank size. For example, Berger et al. (2001) find that the fall in the number of banks is almost completely accounted for by the reduction in small banks with assets under $100m. Moreover, they find that the percentage of industry assets managed by 'megabanks' (i.e., with more than $100b in assets) almost doubled over the fifteen years from 1977 to 1994. The percentage of industry assets managed by small banks, on the other hand, halved over the same period.

The increase in banking competition and improvements in the market for corporate control due to the deregulations are thought to have improved allocative efficiency by allowing capital to flow more freely towards projects yielding the highest returns and to more efficient producers. Moreover, although the number of banks fell over this period, the number of bank branches increased considerably, reflecting the greater competition and the increased choice for consumers in local markets. From a theoretical perspective, these reforms could have had a strong positive effect on entrepreneurship if startups faced substantial credit constraints. Moreover, since entrepreneurs have fewer non-bank options for financing their projects relative to existing firms (e.g., internal cash flow, bond markets), more efficient allocation of capital within the banking industry should lead to a larger increase in entry of startups relative to the entry of new establishments among existing firms.

However, there are two theoretical reasons why these reforms may instead harm the entry of startups. First, Rajan and Petersen (1995) argue that startups benefit from concentrated banking markets because a monopolist bank can engage in inter-temporal cross-subsidization of loans. As a monopolist bank can charge above-market interest rates to mature firms, they can in turn charge below-market rates to potential entrepreneurs. By doing so, the monopolist bank can maximize the long-term pool of older firms to which they lend.

Second, several studies argue that small banks have a comparative advantage relative to large banks at making lending decisions for startups because they are better at screening on 'soft' versus 'hard' information (e.g., Stein 2002; Berger et al. 2005). If lending decisions in larger banks are based on a more hierarchical decision process, the ultimate adjudication decisions may come from officers who do not know potential borrowers personally. These decisions are more likely to be based on credit scoring models that inherently focus on hard information. On the other hand, local loan officers at small banks know information about borrowers that cannot be condensed into a credit score. This ability to lend and monitor based on soft information gives

the loan officers a comparative advantage in lending to entrepreneurs. Since the banking reforms led to a shift in industry structure from small banks towards large banks, this could have had a direct negative effect on lending to startups relative to established firms with a history of audited accounts. On both fronts, therefore, this second set of theories suggest that entrepreneurs may have suffered from the banking deregulations.[7]

As can be seen from Figure 1, the timing of the intrastate and interstate branch banking deregulations is sufficiently different and independent across states that we can jointly investigate the effect of these two reforms on startup entry. The intrastate deregulation captures the relative trade-off between allocative efficiency from increased competition and the potential cost to entrepreneurs from a loss of concentrated markets. The interstate deregulation captures the trade-off between these efficiencies and the potential cost to entrepreneurs from the shift away from small banks as a source of small business lending. Our study can therefore also be seen as a test for the presence of financing constraints in entrepreneurship. Since there are several theoretical channels through which banking competition may hinder startup activity, evidence of an increase in entrepreneurship relative to the entry of new establishments of existing firms would indicate a very strong positive benefit to entrepreneurship through the increase in competition among banks.

We construct tight comparisons of startup entry rates to the facility expansions of existing firms that remove all local conditions common to the two types of entrants. We further control for national changes in entry rates for both types of firms. This platform is only feasible due to our establishment-level data. Since the cross-state variation in the timing of the reforms may have been correlated with the structure of the banking industry[8], prior research regarding the effect of these banking deregulations on the non-financial sector relies on interactions between the timing of the reforms and each industry's dependence on external finance to achieve identification (e.g., Cetorelli and Strahan 2006). We are able to go a step further by exploiting variation across types of entrants within state-industry-year cells. This estimation approach controls for a greater set of omitted factors than earlier work, and we utilize a dynamic model that parses out transitory features of the adjustment process. Most importantly, though, the elasticities of establishment openings for existing firms provide an important benchmark for isolating the

[7] It has been argued that the advances in monitoring technology affected bank lending to mature and public firms, but that this may have had very different effects on startups.

[8] Accounts of the political-economy of the reforms suggest their passage is exogenous to product markets, driven in part by federal actions and state-level structure of the banking industry. Black and Strahan (2001) argue that some of the impetus for the intrastate deregulations came from initiatives taken by the Office of the Comptroller of the Currency that put banks with national charters on par with S&Ls and savings banks that could branch freely within states. The interstate deregulations were driven in part by the S&L crisis in the early 1980s when federal legislators allowed failed banks and thrifts to be acquired by banks in any state, regardless of the state laws governing these transactions. These paved the way for bilateral negotiations between various states to allow interstate banking to capture the benefits of larger, diversified banks that were less susceptible to failure. Krozner and Strahan (1999) also note that the timing of the reforms are driven in part by the relative strength of banking interest groups that favored the deregulation. Appendix Table 1 lists each state and the dates of the branch banking deregulations.

relative importance of these deregulations for entrepreneurship specifically.

3 Longitudinal Business Database

The data for this study are drawn from the Longitudinal Business Database (LBD). Sourced from US tax records and Census Bureau surveys, the LBD provides annual observations for every private-sector, incorporated establishment from 1976 to 1999. Approximately 3.9m establishments, representing over 68m employees, are included each year. As the micro-records document the universe of establishments and firms, rather than a stratified random sample or published aggregate tabulations, the Census Bureau data is an unparalleled laboratory for studying entrepreneurship rates and the life cycles of firms in the U.S. In addition, the LBD lists the physical location of establishments rather than the location where they are incorporated, which allows us to circumvent issues related to higher incorporations in certain states like Delaware.

The comprehensive nature of the LBD facilitates the development of complete state-industry-year panels of birth counts by type of firm and the distribution of establishment entry sizes (in terms of employment). Each establishment is given a unique, time-invariant identifier that can be longitudinally tracked. This allows us to identify the year of entry for new startups or the opening of new plants by existing firms.[9] Second, the LBD assigns a firm identifier to each establishment that facilitates a linkage to other establishments in LBD. This firm hierarchy allows us to separate new startups from expansions by existing multi-unit firms.

Publicly available series do not provide birth counts by state-industry cells; even when they do provide approximations based on total employment, the Census Bureau is required to suppress values that compromise the confidentiality of individual establishments. Moreover, the entry of startup establishments versus expansion establishments is not released. Building from the microdata overcomes these limitations. Our data includes the entry patterns of the manufacturing, services, retail trade, wholesale trade, mining, transportation, and construction sectors covering the 1977-1998 period.[10]

Table 2 provides descriptive statistics on our sample. Over 80% of the 400k new establishments opened in each year are new firm formations. Figure 2 plots the relative entry rates over

[9] We define entry for a given establishment as the first year that it has positive employment. We do not include exit and re-entry in our birth counts. As the data begin in 1976, we can only consider entry from 1977 onward.

[10] Jarmin and Miranda (2002) describe the construction of the LBD. The LBD includes incorporated firms only; unincorporated businesses and partnerships are not considered in this study. Sectors not included in the LBD are agriculture, forestry and fishing, public administration, and private households. We also exclude the US postal service, restaurants and food stores, hospitals, education services, and social services. Finally, we separate the financial services sector for analysis. Incomplete LBD records require dropping 25 state-year files: 1978 (12 states), 1983 (4), 1984 (4), 1985 (1), 1986 (1), 1989 (1), and 1993 (2).

time of startup establishments to the expansion establishments of existing firms, with entry rates in 1977-1981 normalized to 100% for each group. This time plot demonstrates that although startups constitute the vast majority of new establishments, the relative increase in startup activity has consistently lagged that of expansion establishments since the early 1980s. In fact, there is only a 10% increase in the raw number of startup entrants over the twenty-year period, despite a 20% overall growth in LBD employment. Figure 2 also documents a broad decline in entry rates during the early 1990s. This is consistent with the decline in credit available to firms during this period (e.g., Berger et al. 2001; Zarutskie 2006).

These aggregate trends are important when interpreting the upcoming panel estimation results. The aggregate trends of startups and expansion entry by existing firms will be controlled for with separate year fixed effects for each type of firm. These panel effects remove aggregate trends that affect these two groups differently and would otherwise bias the parameter estimates (e.g., greater cyclical volatility of firm formations). These aggregate trends, however, include overall movements in credit access that are partly due to deregulations. The inference of panel estimations using the cross-state banking variation is in part from greater or weaker relative declines in startup entry rates for states that have deregulated.

While startups account for the majority of new establishments, existing firms open new establishments at much larger sizes. New establishments of existing firms start on average with four times the employment of startups. Figure 3 documents the distribution of establishment entry sizes for these types of firms. 76% of new startups begin with five or fewer employees, versus 44% for expansion establishments of existing firms. These distributions suggest startups may face constraints on the intensive margin of entry size as well as the extensive margin of entry rates. Looking at the capital-intensive manufacturing sector in Figure 4, the distribution differentials are even more pronounced. There are, however, many other factors that need to be considered in modelling starting establishment size to isolate the role of financing constraints.[11]

Table 2 concludes with the distribution of entry counts by sector and by region. Manufacturing accounts for just under 10% of the total entry; manufacturing, services, wholesale trade, and retail trade jointly account for 75% of the total entry of new establishments.[12] Despite the well-documented concentration of high-tech entrepreneurship within regions like Silicon Valley and Boston's Route 128, the broad entry rates we consider are more evenly spread across US regions. There are also no substantial differences in the extent to which different types of firms found new establishments across regions. These geographic regularities aid our using of cross-

[11] Dunne et al. (1989) provide additional details on entry patterns in the manufacturing sector.

[12] The exclusion of health, education, social services, and community organizations reduces the proportion of services entry in the sample relative to the overall population. The relative entry of startups versus existing firms in retail trade and construction are quite different. Our core estimations control for detailed industry differences, and we have further confirmed that our results are robust to excluding these sectors entirely.

state variation in banking deregulations to study entrepreneurship, as the results are not overly dependent upon the outcomes of a single state or region.[13]

4 Empirical Results

This section reports our empirical results regarding establishment entry rates and entry sizes. We begin with state-year panel estimations that separately examine the entry rates of startups and expansion establishments. We then turn to dynamic tests and stacked regressions to more carefully evaluate the relative impact of banking deregulations for entrepreneurial activity. These entry rate specifications are done independent of entry sizes; we return to the differences in founding employment evident in Figures 3 and 4 at the close of the section. The empirical results find consistent evidence that the interstate banking deregulations fostered higher entrepreneurial activity relative to facility expansions on both the extensive and intensive margins.

4.1 Pre-Post Deregulation Estimations at State-Year Level

To understand the impact of banking deregulations on entry rates, we first investigate a simple panel data model at the state-year level. The estimation takes the form,

$$\ln(BIR_{st}^{Type}) = \phi_s + \tau_t + \beta_{TRA} TRA_{st} + \beta_{TER} TER_{st} + \varepsilon_{st}, \quad (1)$$

where ϕ_s and τ_t are vectors of state and year fixed effects, respectively. The state effects control for fixed differences in entry rates across states due to factors like California's larger economic size. The year effects account for aggregate changes in entry rates over time that result from the business cycle, national policy changes, and so on. BIR_{st} is the total count of establishment births in the state-year cell for the indicated $Type$ of firm: startups or existing firms. TRA_{st} and TER_{st} model the intrastate and interstate banking deregulations, respectively. These indicator variables take a value of zero before the deregulations and one afterwards. As BIR_{st} is measured in logs, the β coefficients measure the mean percentage increase in a state's births in the years following the deregulations.[14]

[13] See Dumais et al. (2002) and Ellison et al. (2006) for further studies of startup and existing firm expansion agglomeration and coagglomeration, respectively.

[14] The LBD is centered on March of each year. We thus date the reforms such that a passage of TRA in 1987, for example, is coded as changing from 0 to 1 in 1988. Appendix Table 1 lists states and reform dates. We also include in each regression an interaction of the reforms with an indicator for an Economic Census year (i.e., 1977, 1982, 1987, 1992, 1997). In these years, more manpower is devoted to updating the business registry. As a result, longitudinal bumps occur in establishment entry counts for both types of firms. These interactions flexibly accommodate these shifts, although the interactions are insignificant and their coefficients are not informative. They can be excluded from the regressions without impacting the results. See Autor et al. (2006) for further details.

Panel A of Table 3 reports two regressions for three samples: all sectors, manufacturing only, and non-manufacturing. The first regression of each set considers startup entry rates, while the second regression focuses on the entry rates of new establishments opened by existing firms. These six regressions are all undertaken at the state-year level, so that the observation counts do not change across columns. We conservatively cluster standard errors at the state cross-sectional level to address the serial correlation concerns for differences-in-differences estimations of Bertrand et al. (2004). Regressions are weighted by 1977-1985 total birth employment in the state cell; these weights do not change across entrant types.[15]

The specifications find that interstate banking deregulation is consistently associated with higher rates of startup entry. The coefficient elasticity of 6% is smaller, but similar in direction, to the 11% elasticity of Black and Strahan (2002) using Dun & Bradstreet incorporations. This positive response is evident for the whole sample and for the manufacturing and non-manufacturing subsamples. In unreported regressions examining sectors with the non-manufacturing subsample, stronger effects are found in wholesale trade and retail trade than in services. Nevertheless, a higher and statistically significant entry of startups following the interstate reform is evident for each sector analyzed. We find the intrastate banking deregulation is associated with higher entry rates in manufacturing sector only. For non-manufacturers, which again comprise the bulk of the sample, no effect on entry is registered.[16]

These results suggest the interstate branch banking deregulations had a very large economic impact, leading to a 6% growth in startup birth rates. It is premature, however, to infer that these deregulations have a direct, causal benefit for entrepreneurship. Looking at the establishment entry rates of existing firms, the second regression of each set, we find a similar pattern of coefficients. The interstate banking deregulations are again associated with higher entry rates that are statistically different from zero. The estimated elasticity of 4% for existing firms is weaker than the 6% estimated for startups, but we cannot statistically reject that the elasticity estimates are the same.

4.2 Dynamic Estimations at State-Year Level

The joint positive responses of startups and new establishment entry for existing firms following the interstate deregulations warrant further investigation. In order to assign carefully the role of banking deregulations for entrepreneurship, and more generally provide evidence regarding the financial constraints that startups face relative to existing businesses, we propose crafting

[15] The weights afford population estimations of the impact of the banking deregulations. Similar results are obtained in unweighted regressions.

[16] Black and Strahan (2002) find an elasticity of 3% in Dun & Bradstreet incorporations to intrastate deregulations.

more detailed estimations that compare startup entry rates to a baseline naturally offered by the expansion establishments of existing firms in the same state and industry.

Before turning to these stacked estimations, it is useful to examine the dynamic impact of the interstate deregulations on entry rates. This extension to (1) documents whether the entry rates follow the deregulations in a pattern consistent with a causal interpretation. The dynamic perspective further identifies whether the pre-reform establishment entry patterns of existing firms, conditional on removing the panel fixed effects noted in Figure 2, is a suitable benchmark against which to compare startups.[17] The complete dynamic specifications take the form,

$$\begin{aligned} \ln(BIR_{st}^{Type}) &= \phi_s + \tau_t + \sum_{q=-2}^{3} \beta_{TRAt+q} \Delta TRA_{st+q} + \beta_{TRAt+4} TRA_{st+4} \\ &\quad + \sum_{q=-2}^{3} \beta_{TERt+q} \Delta TER_{st+q} + \beta_{TERt+4} TER_{st+4} + \varepsilon_{sjt}. \end{aligned} \tag{2}$$

The pre-reform and post-reform indicators in (1), TRA_{st} and TER_{st}, are replaced by a series of lead and lag indicators. TRA_{st+4} and TER_{st+4} take a value of one four or more years after the deregulation. The variables $\sum_{q=-2}^{3} \Delta TRA_{st+q}$ and $\sum_{q=-2}^{3} \Delta TER_{st+q}$ are six separate indicator variables that span the six-year period from two years prior to the reform to three years after the reform. These six indicators take a value of one in their specific lead or lag year only and are zero otherwise. Their coefficient pattern thus models the short-term dynamic effects around the reform, with TRA_{st+4} and TER_{st+4} capturing outcomes four or more years after the deregulations.

Our main coefficients of interest are the long-term effects β_{TRAt+4} and β_{TERt+4}. The coefficients $\sum_{q=-2}^{3} \beta_{TRAt+q}$ and $\sum_{q=-2}^{3} \beta_{TERt+q}$ focus on the timing of the reform and document whether the entry of new establishments following the reforms is consistent with a causal effect. In particular, we should be concerned if a strong lead effect is evident just before the deregulations are passed, regardless of whether it is heightened or diminished entry rates, as this would suggest an omitted factor is highly correlated with the timing of the deregulations. We also want to confirm that the dynamic pattern of effects leading into the long-term effects make economic sense. Note that the coefficient values for the leads and lags in (2) are relative to the period three years before the reforms and earlier; by comparison, the post indicators in (1) are relative to period immediately before the reforms.

[17] Krozner and Strahan (1999) argue that the timing of the reforms are driven in part by the relative strength of banking interest groups that favored the deregulation. The dynamic specifications identify whether the timing of entry is consistent with greater competition in the banking industry, even if the introduction of the competition itself was endogenous. This has yet to be documented in a consistent way in the literature. Endogeneity in the banking sector can still be viewed as exogenous to the product markets, especially the relative impacts for startups versus facility expansions that we study later in this section. The stacked specifications ultimately remove all state-industry-year trends.

Panel B of Table 3 reports six specifications again examining the startups - existing firms dimension both within and outside of the manufacturing sector. To conserve space, we report in Table 3 a condensed form of (2) where the six single-year leads and lags are consolidated into three two-year increments. The long-term effects are still captured by the four-year lag coefficients β_{TRAt+4} and β_{TERt+4}. Appendix Table 2 reports the complete dynamic specifications for the full sample.

The dynamic specifications show a very consistent entry response for startups and multi-unit firms to the interstate banking deregulation. In both cases, the forward effect is of a small magnitude and statistically not different from zero. After the reforms, the coefficients show an increasing pattern consistent with growing financial access due to greater bank competition. The long-run magnitudes again maintain the expected order, with startups having a greater elasticity than the expansion establishment formation of existing firms. No consistent effect is again evident for the intrastate deregulations.

The second set of regressions in Panel B highlight that the long-run elasticities of entry in the non-manufacturing sectors are higher than those in the manufacturing sector. Some may find this surprising given the perceived higher financial dependency of manufacturing. Two notes can be made. First, many industries within manufacturing (e.g., leather goods) are less dependent on external finance than those in trade or services; we test directly the financial dependency prediction later in this section and find some evidence for it. More importantly, manufacturing is experiencing stagnant employment trends during this period, while other sectors are expanding. It is not surprising that the elasticities of establishment entry to changes in financing constraints are weaker for a declining sector. For a hypothetical industry with no entrepreneurial enticement, the expected elasticity from the deregulations would be zero.

Although the dynamic specifications pinpoint more accurately the lagged timings of the effects, one may still be concerned that the results are due to other factors occurring across states. It is important to note that all states but one move from the control to the treatment group during our sample period, suggesting the timing of this omitted factor would need to be closely correlated with the timing of the deregulations. We also note that the results are robust to including linear state time trends in these state-years panels, as shown in Appendix Table 2. The state time trends require that identification is based solely on the discontinuity surrounding the reform. In the next subsection, we consider specifications that allow us to control entirely for state effects when studying the effect of the reforms on entry in the non-financial sector.

Finally, we can use Table 3's empirical apparatus to analyze further how the banking deregulations impacted the commercial banking industry itself. In particular, we document how the state-level compositions of in-state versus out-of-state banks changed following the banking deregulations. We further analyze the extent to which these changes were driven by large,

multi-state banks. These results are reported in Table 4, which follows the same format as Table 3. Table 4's dependent variables are the log number of banks in a given state-year cell. That is, we aggregate establishments to the bank-level and report results for the total number of banks in a given year.[18]

Column 1 of Panel A shows a sharp increase in the number of out-of-state banks following the interstate deregulations. Moreover, Column 2 shows a significant proportion of this growth was driven by large banks, where we define large banks as those with an average of 500 or more employees prior over the period 1977-1985. The trends confirm the descriptive statistics outlined in Table 1. We report the results from dynamic specifications in Panel B of Table 4. We find no statistically significant lead effect for the entry of the out-of-state banks, and the coefficients grow considerably following the passing of the interstate deregulations. Columns 3 and 4 show these results are robust to including linear state time trends too.

The observed growth of out-of-state banks following the interstate deregulations is informative of the mechanism through which banking liberalizations impacted entrepreneurship in the non-financial sector. Both factors follow the interstate deregulations in dynamically consistent patterns, with limited to no response to intrastate changes. Taken together, these results suggest that increased competition from out-of-state banks played a particularly important role in promoting entrepreneurship. In Section 5, we return to discussing some of the possible reasons why this might have been the case.

4.3 State-Industry-Type-Year Level Data

The state-year panel estimations provide us with two pieces of evidence for moving forward. First, we note that the most simple estimation highlights that interstate deregulations had a positive, significant effect on the entry of startup firms. Moreover, this entry response is dynamically consistent with a view that greater competition from out-of-state banks increased credit for startup firms. However, we also noted the somewhat smaller, but still statistically significant, response for the entry of expansion establishments associated with existing firms. We cannot reject the hypothesis that the two entry elasticities are the same at the state-year level.

In this section, therefore, we take the next step of isolating the impact of the interstate banking deregulations for entrepreneurship by comparing startup entry rates relative to the

[18] As in Table 1, we identify commercial bank establishments as SIC 602. A particular advantage of the LBD data in this context is the ability to study the long-run effects of these reforms on the number and size of out-of-state banks. Following the Riegle-Neal Act of 1994, banks are not required to hold their assets locally in each subsidiary. Accordingly, prior studies using bank assets have been limited in their ability to drawn inferences beyond 1994. Since the LBD focuses on establishment-level employment, it provides a consistent longitudinal metric before and after the Riegle-Neal Act.

establishment expansion baseline at a more granular level of analysis. The empirical claim is that facility expansions of established firms can serve as an appropriate control group conditional on removing the aggregate differences documented in Figure 2. Panel B of Table 3 suggests that this reasonable. Similar to the startups, the facility expansions do not have a lead pattern prior to the inter-state reforms; moreover, the dynamic growth in their coefficients is reasonable.

With this comparison in mind, we move to a more stringent specification that exploits the full potential of the Census Bureau data. We calculate from the LBD entry counts by cells constructed on four dimensions: state, SIC2 industry, year, and type (i.e., startup or existing firm). Put another way, we stack the data so that both entry types are included in the same regression rather than in separate regressions; we also incorporate the industry dimension. Over 110k observations are created through this technique. We can easily relate this augmented specification, however, to the earlier state-year estimations through the specification,

$$\begin{aligned}
\ln(BIR_{sit}^{Type}) &= \phi_{si}^{Type} + \tau_t^{Type} + \sum_{q=-2}^{3} \beta_{TRAt+q}^{Startup} \Delta TRA_{st+q}^{Startup} + \beta_{TRAt+4}^{Startup} TRA_{st+4}^{Startup} \\
&+ \sum_{q=-2}^{3} \beta_{TRAt+q}^{Existing} \Delta TRA_{st+q}^{Existing} + \beta_{TRAt+4}^{Existing} TRA_{st+4}^{Existing} \\
&+ \sum_{q=-2}^{3} \beta_{TERt+q}^{Startup} \Delta TER_{st+q}^{Startup} + \beta_{TERt+4}^{Startup} TER_{st+4}^{Startup} \\
&+ \sum_{q=-2}^{3} \beta_{TERt+q}^{Existing} \Delta TER_{st+q}^{Existing} + \beta_{TERt+4}^{Existing} TER_{st+4}^{Existing} + \epsilon_{sit}^{Type}.
\end{aligned} \tag{3}$$

In this specification, ϕ_{si}^{Type} is a vector of state-industry-type cross-sectional fixed effects similar to state vector ϕ_s in (2). Likewise, τ_t^{Type} extends the earlier vector of year fixed effects τ_t to be by $Type$. These two extensions allow the startups and existing firms to have independent panel effects as in the separated regressions. The remainder of (3) interacts the dynamic TRA and TER deregulation indicators from (2) to be by $Type$. By interacting both $Type$ forms, the main effect is dropped and the coefficients replicate the single $Type$ specifications above.[19]

The first column of Table 5 shows this proposed similarity. The dependent variable is again the log establishment entry counts in constructed cells. The first block of coefficients are for the startup type interactions with the two sets of reforms; these coefficients are very close to the

[19] Similar to the earlier specifications, we include interactions for Economic Census years and weight the regressions by the 1977-1985 birth employments in the state-industry cell. While all state-year observations have startup and facility expansions, this is not true at the industry level. To maintain a consistent observation count in log specifications, we recode a zero entry count as one and include unreported dummies for zero count observations by type. The results are robust to dropping these observation entirely; in general, these cells receive very small weight.

estimates in Column 1 of Table 3. The lower block are interactions for expansions by existing firms; these parallel Column 2 of Table 3. These coefficients are estimated jointly, with standard errors conservatively clustered at the state-type level. The minor differences to Table 3 come from including the industry dimension, but the dynamic patterns and coefficient magnitudes are similar to the earlier patterns.

Column 2 of Table 5 extends (3) to include state-industry-year fixed effects. As these additional fixed effects saturate the model, the dynamic coefficients for startup firms become relative to the establishment expansions of existing firms. Indeed, this specification is only possible by contrasting types within a state-industry-year cell, and separate coefficients for expansion establishments are no longer estimated. These fixed effects fully absorb changes in local conditions at the state-industry level. They thus account for the state-year and industry-year dynamics typically modelled in this literature, further easing any endogeneity concern. Moreover, the fixed effects control for the unique outcomes of specialized state-industry combinations like the software industry in Silicon Valley.[20] From an econometric standpoint, this specification allows us to isolate the elasticity from more potential omitted factors. From a substantive perspective, this second specification directly contrasts the growth of startups following the banking reforms to the establishment expansions of existing firms.

Column 2's differential elasticity estimate of 10.6% for startups relative to the opening of new establishments by existing firms is our preferred estimation. This estimate is statistically different from zero; recall that this statistical difference could not be established with the earlier state-year estimations. Columns 3 and 4 report two robustness checks, the first an unweighted specification and the second dropping the period after the passage of the Riegle-Neal Act of 1994 that allowed national interstate branch banking. The continued positive elasticity, along with the dynamic pattern of effects, suggests that the interstate deregulations had a positive impact for entrepreneurship relative to existing businesses. More generally, it points to specific financing constraints faced by entrepreneurs that were in part eased by these reforms.

4.4 Financial Dependency Interactions

Our final test on aggregate entry rates considers industry-level financial dependence. We undertake these specifications as a robustness check on our earlier findings and to compare our results with other studies that exploit this specification. We follow Rajan and Zingales (1998) and Cetorelli and Strahan (2006) in constructing a measure of the dependence of industries on

[20]It is important to note that cross-sectional fixed effects are also included. Estimations without the cross-sectional controls can be biased by the non-proportional allocation of industries across states, even if state-year and industry-year controls are included.

external finance using Compustat firms.[21] Using this measure as an indicator for the relative dependence on bank finance across industries, we check whether startup activity in dependent industries benefited more from the deregulation relative to those in non-dependent industries.

If startups are more financially constrained, we should expect that the relative elasticity of entry for startups compared to expansion of established firms should be greater in industries that are more dependent on external finance compared to industries that are less dependent on external finance. The results of these regressions are reported in Table 6. In all four specifications, the higher coefficient magnitudes for financially dependent sectors support the theoretical prediction, although the long-term elasticities are often not statistically different. The differences within manufacturing, which is the typical sector studied, are stronger than the overall differences.

Although we report these results on external dependence as a robustness check, they are in fact an even more stringent test on the presence of credit constraints than has been identified in the prior literature. A first difference compares the elasticity of entry among startups to existing firms, and the second difference compares these elasticities in industries that are more dependent on external finance.

4.5 Birth Size Specifications

Having documented the effect of the banking reforms on the overall entry rates for startup establishments, we close with the size distribution at which startups enter. Theoretical models of financing constraints suggest that even if potential entrepreneurs are not precluded from starting a new business due to financing constraints, they may still start firms that are smaller than is optimal for the project at hand (e.g., Evans and Jovanovic 1989). If indeed the increases in relative entry rates are an indication of credit constraints facing potential entrepreneurs, we may also find effects in the intensive margin of initial firm employment.

Empirically identifying the effect of changes in financing constraints on the intensive margin of entry is complicated, however, by the fact that there are simultaneous changes in both the extensive and the intensive margins. The ideal estimations would compare entry sizes before and after the reforms for firms that would have entered regardless of the banking deregulations. In this case, average entry size could be an appropriate metric. The earlier estimations, however, document that greater entry is facilitated by the deregulations, and we do not have a way of distinguishing which firms would have entered in the counterfactual. This is particularly true

[21] Following Rajan and Zingales (1998), we take the universe of Compustat firms in the "Industrial Annual" database in the period 1990-2000. We compute a measure of external dependence at the SIC2 level. We then create an indicator variable for an industry being above or below the median external dependence.

at the lower end of the size distribution, where we might expect to see the strongest effects on both the intensive and extensive margins of greater financial access.

To clarify these issues, we first repeat (3) with the vector of state-industry-year effects for different entry sizes. We group entering establishments into four size buckets based upon employment in the year of entry: 1-5 employees, 6-20 employees, 21-100 employees, and over 100 employees. The coefficients on the banking reform indicators in these regressions estimate the relative elasticity of startup entry rates to facility expansions within each size grouping. The results of these regressions are reported in the first four columns of Table 7.

Table 7 shows that relative growth in startup entry rates following the interstate deregulations are particularly strong at the lower end of the entry size distribution. The increased entry in the 1-5 employee bucket offers the best indication of the extensive margin of entry. The greater relative increase in entry within the 6-20 employee category suggests that the reform also had an effect on the intensive margin by boosting the size at which smaller firms enter. The coefficient in this specification implies a 20% increase in relative entry in the 6-20 employee category following the interstate deregulations. The long-term relative increases are weaker in the larger entry size categories. This entry size pattern is consistent with financing constraints impacting both the extensive and intensive margins of entrepreneurship.[22]

We also undertake a second test in Column 5 of Table 7 that employs the longitudinal nature of the Census Bureau data. For each establishment that survives three years, we calculate its entry size relative to the maximum employment it achieves in its first three years of operation. We then calculate the mean of this entry size ratio by state-industry-type-year cells. Examining the unweighted means across these cells, startup firms and facility expansions enter at 68% and 75% of their maximum three-year sizes, respectively.

These lower relative entry sizes for startups may directly reflect financing constraints on the intensive margin, but the differential may include other factors like increased caution due to greater uncertainty too. To assess whether financing constraints play an important role, we test whether startups enter closer to their maximum three-year sizes after the banking deregulations. Using the (3) framework, the estimation is again a comparison to the baseline provided by facility expansions. This approach provides a more direct metric of financing constraints on the intensive margin by looking within establishments rather than at the cross-section of entry. It is potentially limited, however, by the conditioning on survival for three years. In particular, startups have different hazard functions of failure relative to facility expansions, and this may

[22] Table 7 finds more mixed evidence than the aggregate entry regressions regarding the impact of intrastate deregulations. There is some evidence that relative entry rates for startups, especially in the larger size categories, may have declined following these reforms.

introduce some bias in the mean ratios.[23]

Column 5 of Table 7 again finds no measurable impact on the intensive margin following the intrastate deregulations. Following the interstate deregulations, however, there was a 2% increase in the entry sizes of startups compared to the maximum sizes they achieved in the first three years of operation. This estimation is again a relative comparison to the responses of expansion establishments for existing firms, providing evidence that entrepreneurs in particular are able to enter closer to their optimal project sizes following the deregulations. While a full analysis of the entry sizes requires a broader investigation of the firm size distribution, this result again suggests that the effects of financing constraints for entrepreneurship are present on both the extensive and intensive entry margins.

5 Conclusions

Although there is a growing consensus that financial markets play an important role in driving economic growth, the micro-foundations behind this relationship are much less understood. The role of the banking industry in promoting entry through the efficient allocation of capital is of particular interest in this context, since there is increasing evidence that entrepreneurship plays a key role in facilitating innovation, impacting industry structure, and promoting economic growth.

In this paper, we look at how the increase in U.S. banking competition through the deregulation of branch banking affected the entry of new establishments. We employ unique establishment-level data housed in the Census Bureau's Longitudinal Business Database. These micro-records allow us to compare the elasticity of entry for startups relative to the opening of new plants by existing firms. This approach allows us to isolate the differential effect of the reforms and financial constraints on entrepreneurship. In addition, we can study changes in the entry size distribution of new entrants.

We do not find that the intrastate branch banking deregulations had a consistent, measured impact on either the entry rates or the entry sizes of new establishments. This was true for both startups and the new establishments of existing firms. Our findings suggest that the intrastate branch banking deregulations did not affect the competitive environment of the local banking industry significantly, at least not in such a way that affected the entry of new businesses.

[23] Taking manufacturing as an example, about 50% of startups fail in their three years of operation versus 40% of expansion establishments. The three-year window trades off this survival bias with allowing more time for new establishments to reach their desired size (e.g., due to internal cash flows or better external finance opportunities).

On the other hand, we find that the interstate branch banking deregulations had a strong positive effect on the entry of startups that was significantly higher than that of existing firms. The rate of entry among startups relative to existing firms was 10% higher in states that deregulated interstate branch banking relative to states that did not. We also find evidence for growth in employment size at entry. Our results suggest that the positive effect of banking competition due to the deregulations outweighed the potential negative effects that the banking competition and the fall in the number of small banks might have had on startup entry (e.g., Rajan and Petersen 1995; Stein 2002).

Our results also help shed light on the apparent contradictory findings that prior studies have had regarding branch banking deregulations. On the one hand, aggregate studies using loan-level data on the U.S. suggest that lending to small businesses declined considerably in the late 1980s and early 1990s, indicating that these reforms had an adverse effect on entrepreneurship (e.g., Berger et al. 2001; Zarutskie 2006). On the other hand, Erel (2006) finds that small businesses seemed to benefit significantly from lower spreads following bank mergers. Moreover, Black and Strahan (2002) and Cetorelli and Strahan (2006) find evidence that the reforms were beneficial for entrepreneurship.

We document that our results are consistent with both findings. Although we find a decline in the aggregate entry rates among both established firms and startups around the time of the 'credit crunch' documented by Berger et al. (2001), we find that the effect of this credit crunch on entrepreneurial firms relative to that of existing firms was less in states that deregulated compared to those that did not. Put differently, our positive coefficients capture both a greater increase in relative startup activity in boom years, and a smaller decline in startup activity in crunch years. Thus, even though there was a decline in the overall level of startup activity in the early 1990s, these reductions were smaller in states that deregulated earlier.

Finally, in examining banking deregulation, our study provides direct evidence of a mechanism through which better functioning capital markets might have an impact on competition and growth because of the better allocation of capital to new businesses. This mechanism has been posited as a factor that might explain why countries with better developed capital markets experience higher rates of economic growth (e.g., King and Levine 1993a, 1993b; Levine 1997; Rajan and Zingales 2003) but until recently had largely been tested using cross-country correlations. Thus, our findings are relevant to the small, but growing, empirical literature looking at the micro-mechanism behind financial-sector distortions and how reforms that impact the financing environment may improve the real economy through the reallocation of resources in the non-financial sectors (e.g., Bertrand et al. 2006, Nanda 2006).

We see two areas in particular that warrant further study. First, the specific mechanisms through which the increased banking competition impacted entrepreneurial entry should be ana-

lyzed, especially the trade-off between this competition and the benefits of relationship banking. The limited impact of the intrastate deregulations for entry rates, especially compared to the interstate deregulations, suggests that either the intrastate deregulations did not have enough bite or that there was something specific about the out-of-state banks that was important for promoting entrepreneurship. While some argue that the interstate deregulations enhanced the market for corporate control, others suggest that the main benefits of the interstate banking deregulation were the better allocation of credit and the better use of technology by the large, multi-state banks. Understanding these mechanisms is an important question for future analysis, especially whether the reforms came at the expense of firms that rely more on soft information.

The Census Bureau data is an ideal source to investigate this further, as it provides county-level detail on the location of bank branches and new businesses. In addition, it provides some data on the loans and revenue sources for local bank branches in the Census of Finance, Insurance and Real Estate. We hope to combine this data, once access is obtained, with industry-level characteristics regarding the reliance of young firms for soft information early in their life-cycle. This should help disentangle some of these competing effects. Second, we can track merger and acquisition activity in the banking sector at the branch level through the LBD. This should allow us to compare the effects on startup entry in counties that experienced competition through the acquisition of local banks, as opposed to competition through the threat of acquisition or *de novo* entry from large MBHCs.

The effect of these deregulations on the intensive margin of firms is a second area that requires more study. Understanding how the growth and the survival of firms responded to the deregulations is an important area of further investigation. We intend to embed this growth analysis within a future study of the establishment size and firm size distributions. This work will highlight the role of greater financial access and increased entrepreneurship for long-term changes in industrial structure and economic performance.

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Fig. 1: U.S. Branch Banking Deregulations

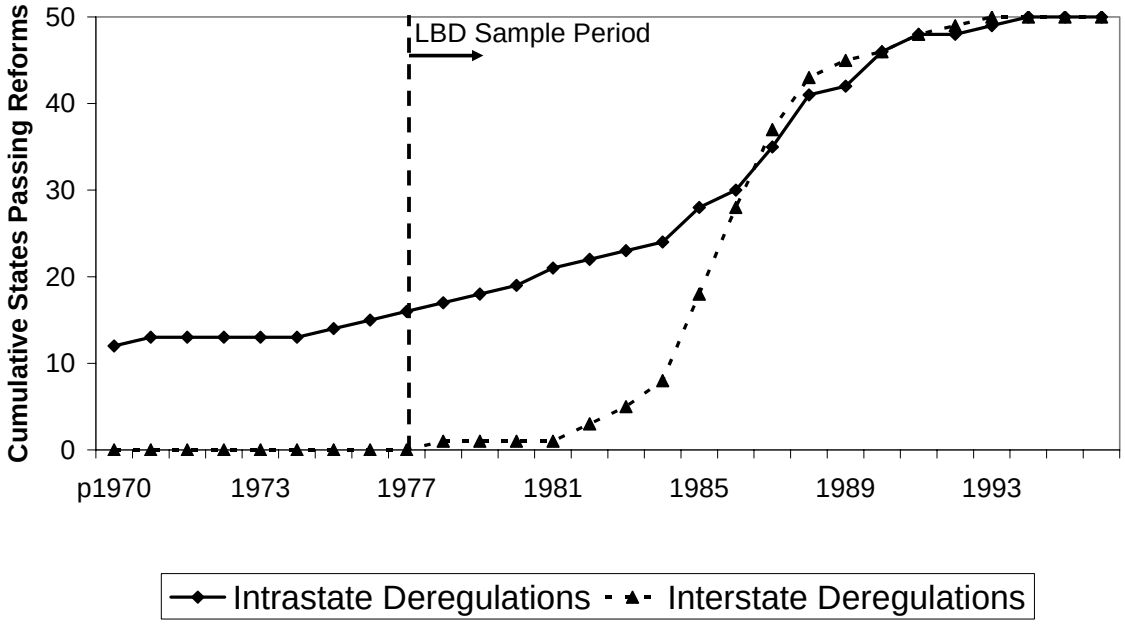

Fig. 2: Relative Birth Counts by Type

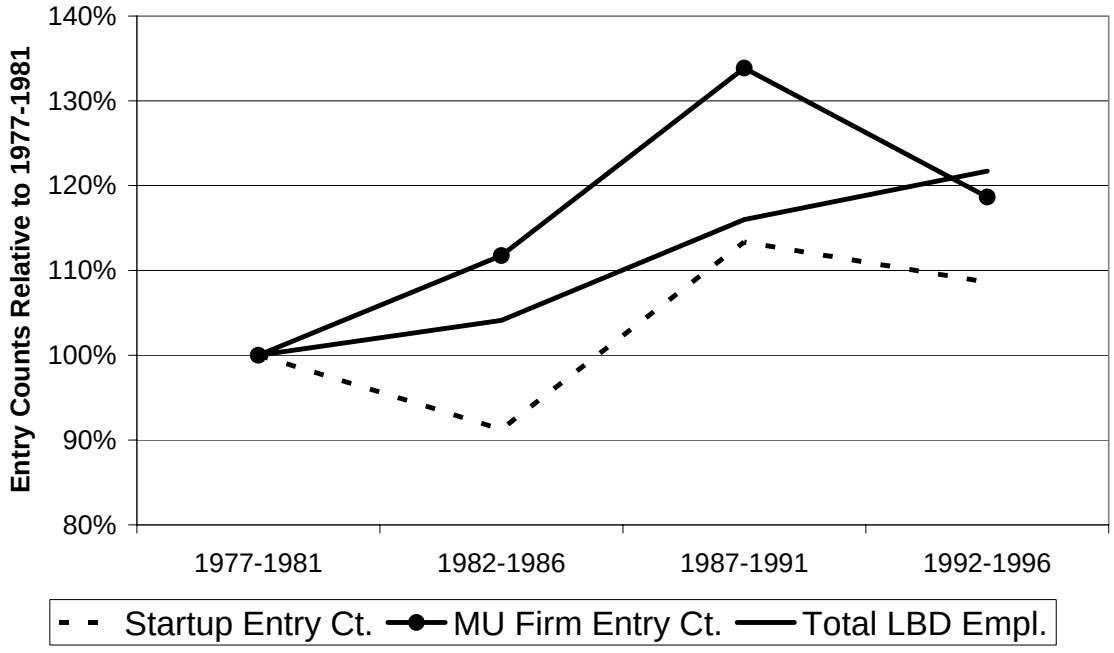

Fig. 3: Distribution of Entry Sizes

All Sectors, By Type of Entrant

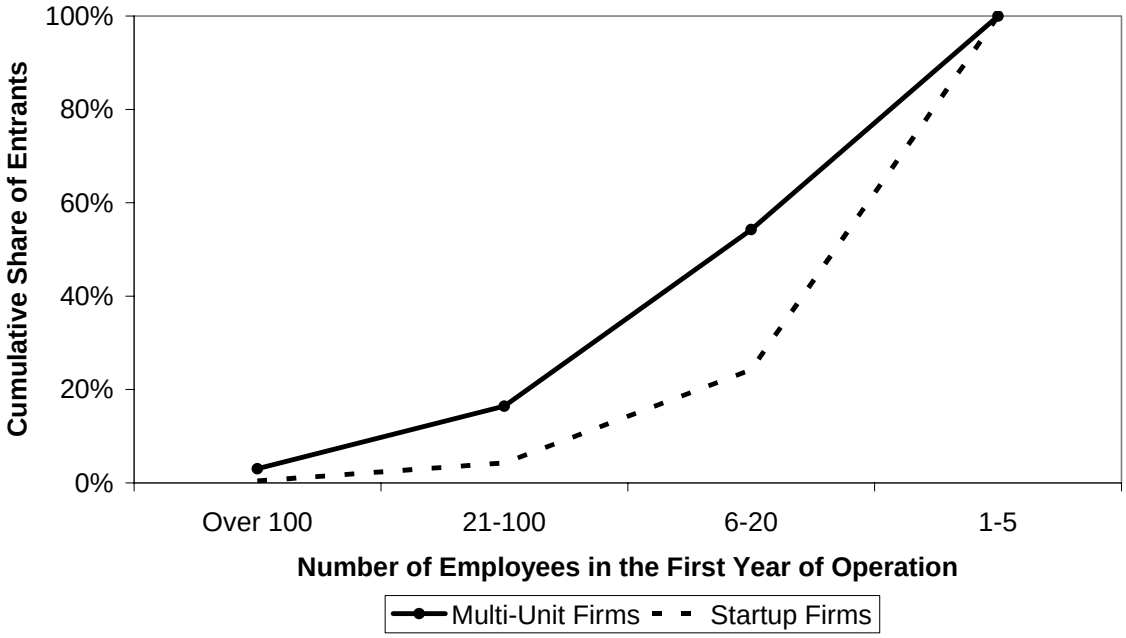

Fig. 4: Distribution of Entry Sizes

Manufacturing Sector, By Type of Entrant

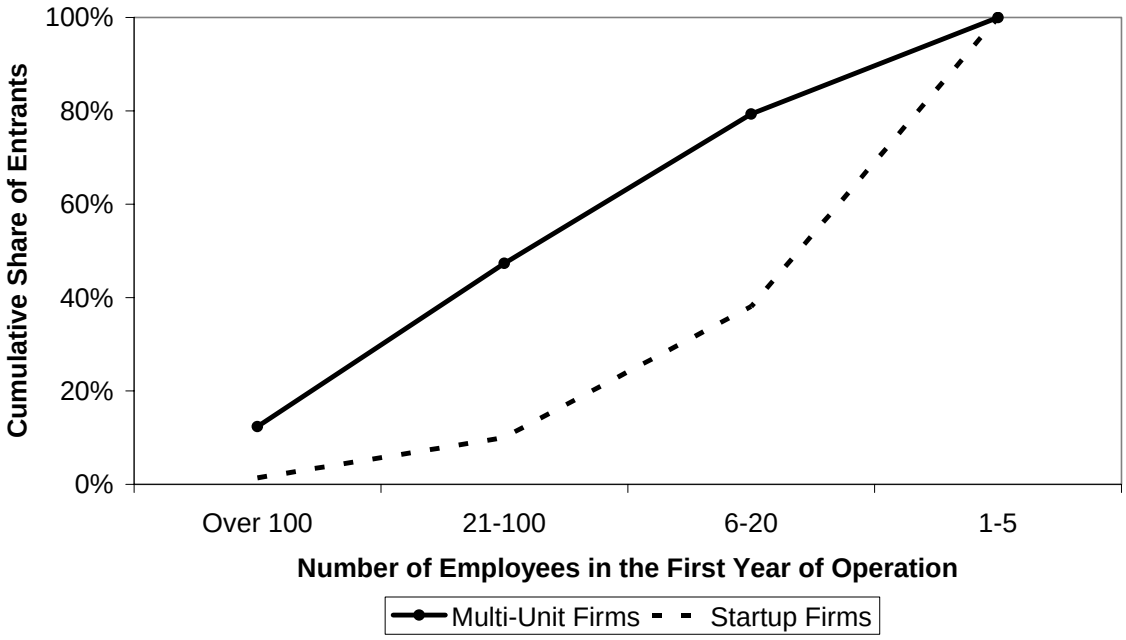

Table 1A: LBD-Based Descriptive Statistics on U.S. Banking Industry

	1977	1994
Total Number of Banking Organizations	12,810	8,547
% with less than 50 employees	79.0%	69.8%
% with branches in multiple states	0.3%	2.6%
Total Number of Banking Branches	38,231	64,155
% owned by banks with 500+ employees	49.5%	65.9%
% owned by banks with mean 500+ employees before 1985	52.4%	62.4%
% owned by banks originally located in other states	2.4%	25.3%

Notes: Descriptive details taken from LBD for SIC 602 (1987 classifications).

Table 1B: Asset-Based Descriptive Statistics on U.S. Banking Industry

	1979	1994
Total Number of Banking Organizations	12,463	7,926
Small Banks (less than $100m in assets)	80.3%	71.1%
Real Gross Industry Assets (in trillions of 1994 dollars)	3.26	4.02
Industry Assets in Megabanks (more than $100b in assets)	9%	19%
Industry Assets in Small Banks (less than $100m in assets)	14%	7%

Source: Berger at al. (2001).

Table 2: LBD Descriptive Statistics on U.S. Product Market Entry

	All Entering Establishments	Establishments of New Start-up Firms	Establishments of Existing Firms
Mean Annual Entry Counts	407,783	335,807	71,976
Mean Annual Entry Empl.	3,811,409	2,081,801	1,729,608
Average Entry Size	9.3	6.2	24.0
Entry Counts by Entry Size			
1-5 Employees	70.3%	75.9%	44.4%
6-20 Employees	22.8%	19.8%	36.6%
21-100 Employees	5.8%	3.8%	14.9%
100+ Employees	1.1%	0.4%	4.1%
Entry Counts by Sector			
Manufacturing	9%	9%	6%
Services	28%	29%	22%
Wholesale Trade	12%	11%	17%
Retail Trade	25%	22%	42%
Mining	1%	1%	1%
Construction	17%	20%	1%
Transportation	7%	7%	10%
Entry Counts by Region			
Northeast	19%	20%	17%
South	36%	35%	37%
Midwest	22%	21%	24%
West Coast	24%	24%	22%

Notes: Descriptive statistics for entering establishments outside of the financial sector in the Longitudinal Business Database from 1977-1998. Jarmin and Miranda (2002) describe the construction of the LBD. The LBD includes incorporated firms only; unincorporated businesses and partnerships are not considered in this study. Sectors not included in the LBD are agriculture, forestry and fishing, public administration, and private households. We also exclude the US postal service, restaurants and food stores, hospitals, education services, and social services. Incomplete LBD records require dropping 25 state-year files: 1978 (12 states), 1983 (4), 1984 (4), 1985 (1), 1986 (1), 1989 (1), and 1993 (2).

Table 3: Banking Deregulations and Establishment Entry Rates in U.S. Product Markets

	All Sectors		Manufacturing		Non-Manufacturing	
	Single-Unit Start-Ups	Multi-Unit Establish. Openings	Single-Unit Start-Ups	Multi-Unit Establish. Openings	Single-Unit Start-Ups	Multi-Unit Establish. Openings
	(1)	(2)	(3)	(4)	(5)	(6)
	A. Pre-Post Specifications for Log Establishment Birth Counts by State-Year					
Intra-State Banking Dereg. Post Indicator	0.000	-0.015	0.037	0.023	-0.004	-0.020
	(0.025)	(0.035)	(0.018)	(0.042)	(0.027)	(0.036)
Inter-State Banking Dereg. Post Indicator	0.060	0.037	0.059	0.039	0.059	0.040
	(0.019)	(0.018)	(0.021)	(0.028)	(0.021)	(0.019)
	B. Dynamic Specifications for Log Establishment Birth Counts by State-Year					
Intra-State Banking Dereg. Fwd. 1-2 Yrs	-0.039	-0.015	0.025	0.032	-0.046	-0.022
	(0.034)	(0.024)	(0.022)	(0.039)	(0.037)	(0.024)
Intra-State Banking Dereg. Lag 0-1 Yr	-0.041	-0.018	0.012	-0.003	-0.047	-0.020
	(0.046)	(0.046)	(0.036)	(0.062)	(0.048)	(0.046)
Intra-State Banking Dereg. Lag 2-3 Yrs	-0.045	0.012	0.011	0.115	-0.052	0.003
	(0.035)	(0.043)	(0.031)	(0.051)	(0.036)	(0.046)
Intra-State Banking Dereg. Lag 4+ Yrs	-0.029	0.004	0.001	-0.001	-0.032	0.002
	(0.048)	(0.050)	(0.034)	(0.055)	(0.050)	(0.052)
Inter-State Banking Dereg. Fwd. 1-2 Yrs	0.025	-0.021	0.052	0.027	0.023	-0.024
	(0.032)	(0.026)	(0.025)	(0.044)	(0.034)	(0.027)
Inter-State Banking Dereg. Lag 0-1 Yr	0.059	0.005	0.082	0.061	0.057	0.004
	(0.033)	(0.029)	(0.027)	(0.049)	(0.035)	(0.030)
Inter-State Banking Dereg. Lag 2-3 Yrs	0.170	0.078	0.137	0.071	0.173	0.083
	(0.038)	(0.035)	(0.031)	(0.056)	(0.039)	(0.036)
Inter-State Banking Dereg. Lag 4+ Yrs	0.223	0.129	0.141	0.071	0.231	0.141
	(0.056)	(0.046)	(0.041)	(0.064)	(0.060)	(0.048)

Notes: Panel estimations consider log counts of establishment births taken from the LBD for 1977-1998. Sectors and types of firms for dependent variables are indicated in the column headers. Single-unit start-ups are new firm formations. Multi-unit establishment openings are new establishment openings by existing firms. The sample includes all states and DC from 1977-1998, excepting 25 state-year cells where LBD files are not available, for 1097 observations. Regressions include state and year fixed effects. Regressions include unreported interactions of explanatory indicators with a Census year dummy. Regressions are weighted by average birth employment in cells from 1977-1985. Standard errors are conservatively clustered at the state cross-sectional level.

Pre-Post specifications compare annual entry rates before and after the state-level banking deregulation indicated. Dynamic specifications replace the post deregulation indicators with a series of leads and lags for each reform. To conserve space, leads and lags are consolidated into two-year increments extending from two years prior to the deregulations to four or more years after the deregulations. The coefficient values for the dynamic leads and lags are relative to the period three years before the reforms and earlier. Appendix Table 2 presents the complete lag structure for Columns 1-2 and extensions to include linear state time trends.

Table 4: Banking Deregulations and Changes in the Composition of U.S. Banking Industry

	Base Specification		Including Linear State Time Trends	
	Number of Out of State Commercial Banks	Number of Out of State Banks with Mean 500+ Empl. before 1985	Number of Out of State Commercial Banks	Number of Out of State Banks with Mean 500+ Empl. before 1985
	(1)	(2)	(3)	(4)
	A. Pre-Post Specifications for Log Bank Counts by State-Year			
Intra-State Banking Dereg. Post Indicator	0.244	0.264	0.053	0.136
	(0.187)	(0.158)	(0.107)	(0.125)
Inter-State Banking Dereg. Post Indicator	0.513	0.521	0.388	0.409
	(0.123)	(0.128)	(0.119)	(0.114)
	B. Dynamic Specifications for Log Bank Counts by State-Year			
Intra-State Banking Dereg. Fwd. 1-2 Yrs	0.043	0.029	-0.155	-0.144
	(0.123)	(0.107)	(0.125)	(0.121)
Intra-State Banking Dereg. Lag 0-1 Yr	0.265	0.258	-0.071	-0.029
	(0.189)	(0.147)	(0.145)	(0.153)
Intra-State Banking Dereg. Lag 2-3 Yrs	0.423	0.373	-0.056	-0.031
	(0.254)	(0.213)	(0.194)	(0.195)
Intra-State Banking Dereg. Lag 4+ Yrs	0.173	0.179	-0.167	-0.072
	(0.213)	(0.183)	(0.286)	(0.287)
Inter-State Banking Dereg. Fwd. 1-2 Yrs	0.231	0.253	0.145	0.175
	(0.153)	(0.136)	(0.146)	(0.138)
Inter-State Banking Dereg. Lag 0-1 Yr	0.588	0.630	0.458	0.512
	(0.199)	(0.189)	(0.191)	(0.165)
Inter-State Banking Dereg. Lag 2-3 Yrs	0.943	0.936	0.787	0.797
	(0.216)	(0.214)	(0.233)	(0.201)
Inter-State Banking Dereg. Lag 4+ Yrs	1.074	1.133	0.911	0.992
	(0.282)	(0.290)	(0.269)	(0.251)

Notes: Panel estimations consider log counts of out-of-state banks taken from the LBD for 1977-1998. Commercial banks are defined as firms in SIC 602 (1987 classification). Home state for a bank is defined through the bank's primary state in its first year of operation. See Table 3 for regression details. Dummy variables are included for zero counts in the log specification. The results are robust to dropping zero-valued counts.

Table 5: Stacked Specifications of Establishment Entry Rates in U.S. Product Markets

	Regr. With ST-SIC-TYPE & TYPE-YR FE	Column 1 Adding ST-SIC-YR FE	Column 2 Without Weights	Column 2 Restricting Sample to Prior to 1994
	(1)	(2)	(3)	(4)
	Dependent Variable is Log Establishment Birth Counts by State-SIC2-Type-Year			
Single-Unit Start-Ups Interactions:				
Intra-State Banking Dereg. Fwd. 1-2 Yrs	-0.037 (0.030)	-0.016 (0.023)	-0.006 (0.022)	-0.006 (0.022)
Intra-State Banking Dereg. Lag 0-1 Yrs	-0.044 (0.039)	-0.022 (0.035)	0.007 (0.025)	-0.007 (0.031)
Intra-State Banking Dereg. Lag 2-3 Yrs	-0.055 (0.027)	-0.082 (0.036)	-0.050 (0.026)	-0.051 (0.034)
Intra-State Banking Dereg. Lag 4+ Yrs	-0.035 (0.039)	-0.045 (0.029)	-0.056 (0.019)	0.021 (0.029)
Inter-State Banking Dereg. Fwd. 1-2 Yrs	0.028 (0.028)	0.027 (0.031)	0.028 (0.021)	0.031 (0.031)
Inter-State Banking Dereg. Lag 0-1 Yrs	0.054 (0.027)	0.038 (0.033)	0.021 (0.029)	0.050 (0.033)
Inter-State Banking Dereg. Lag 2-3 Yrs	0.152 (0.033)	0.073 (0.039)	0.033 (0.027)	0.089 (0.040)
Inter-State Banking Dereg. Lag 4+ Yrs	0.202 (0.041)	0.106 (0.038)	0.059 (0.033)	0.122 (0.045)
Existing Firms Interactions:				
Intra-State Banking Dereg. Fwd. 1-2 Yrs	-0.021 (0.030)			
Intra-State Banking Dereg. Lag 0-1 Yrs	-0.021 (0.048)			
Intra-State Banking Dereg. Lag 2-3 Yrs	0.026 (0.044)			
Intra-State Banking Dereg. Lag 4+ Yrs	0.009 (0.052)			
Inter-State Banking Dereg. Fwd. 1-2 Yrs	0.001 (0.031)			
Inter-State Banking Dereg. Lag 0-1 Yrs	0.016 (0.036)			
Inter-State Banking Dereg. Lag 2-3 Yrs	0.079 (0.036)			
Inter-State Banking Dereg. Lag 4+ Yrs	0.096 (0.049)			
Observations	111,894	111,894	111,894	85,884

Notes: Panel estimations consider log birth counts of establishments taken from the LBD for 1977-1998. Annual cells are constructed by State-SIC2-Type, where Type includes entering start-ups and existing firms. Banking deregulations are dynamically modeled through indicator variables as in Table 3. All regressions include cross-sectional State-SIC2-Type and longitudinal Type-Year fixed effects. Columns 2-4 further include State-SIC2-Year fixed effects that remove all local conditions common across Types. In these saturated models, the start-up response is estimated relative to facility expansions, and separate coefficients for expansion establishments are no longer estimated or reported. Regressions include unreported dummies for cells with zero births and unreported interactions of explanatory variables with a Census year dummy. Regressions are weighted by average birth employment in cells from 1977-1985. Standard errors are conservatively clustered at the cross-sectional State-Type level.

Table 6: Financial Dependency in Stacked Specifications of Est. Entry Rates in U.S. Product Markets

	Regr. With ST-SIC-TYPE & TYPE-YR & ST-SIC-YR FE	Column 1 Without Weights	Column 1 Restricting Sample to Prior to 1994	Column 1 Restricting Sample to Manufacturing
	(1)	(2)	(3)	(4)
	Dependent Variable is Log Establishment Birth Counts by State-SIC2-Type-Year			
Financially Dependent Sectors				
Single-Unit Start-Ups Interactions:				
Intra-State Banking Dereg. Fwd. 1-2 Yrs	-0.029 (0.023)	0.003 (0.026)	-0.018 (0.023)	0.070 (0.054)
Intra-State Banking Dereg. Lag 0-1 Yrs	-0.023 (0.036)	0.036 (0.031)	-0.001 (0.032)	0.046 (0.052)
Intra-State Banking Dereg. Lag 2-3 Yrs	-0.077 (0.037)	0.003 (0.029)	-0.037 (0.035)	-0.174 (0.059)
Intra-State Banking Dereg. Lag 4+ Yrs	-0.043 (0.031)	-0.037 (0.025)	0.034 (0.034)	0.004 (0.060)
Inter-State Banking Dereg. Fwd. 1-2 Yrs	0.032 (0.031)	0.052 (0.025)	0.035 (0.030)	0.051 (0.063)
Inter-State Banking Dereg. Lag 0-1 Yrs	0.005 (0.030)	0.014 (0.034)	0.017 (0.031)	0.092 (0.064)
Inter-State Banking Dereg. Lag 2-3 Yrs	0.063 (0.039)	0.040 (0.031)	0.076 (0.041)	0.140 (0.083)
Inter-State Banking Dereg. Lag 4+ Yrs	0.118 (0.039)	0.098 (0.037)	0.141 (0.046)	0.224 (0.087)
Non-Financially Dependent Sectors				
Single-Unit Start-Ups Interactions:				
Intra-State Banking Dereg. Fwd. 1-2 Yrs	0.012 (0.036)	-0.015 (0.029)	0.021 (0.036)	0.007 (0.039)
Intra-State Banking Dereg. Lag 0-1 Yrs	-0.018 (0.039)	-0.021 (0.029)	-0.017 (0.041)	-0.003 (0.060)
Intra-State Banking Dereg. Lag 2-3 Yrs	-0.088 (0.041)	-0.100 (0.030)	-0.078 (0.052)	-0.066 (0.055)
Intra-State Banking Dereg. Lag 4+ Yrs	-0.048 (0.032)	-0.075 (0.022)	-0.006 (0.048)	-0.033 (0.041)
Inter-State Banking Dereg. Fwd. 1-2 Yrs	0.019 (0.035)	0.004 (0.022)	0.026 (0.034)	0.027 (0.038)
Inter-State Banking Dereg. Lag 0-1 Yrs	0.109 (0.044)	0.029 (0.031)	0.123 (0.043)	-0.031 (0.058)
Inter-State Banking Dereg. Lag 2-3 Yrs	0.093 (0.041)	0.026 (0.028)	0.115 (0.044)	0.014 (0.071)
Inter-State Banking Dereg. Lag 4+ Yrs	0.078 (0.038)	0.021 (0.033)	0.082 (0.055)	-0.031 (0.107)
Observations	111,894	111,894	85,884	43,880

Notes: See Table 5. Additional interactions taken for financially dependent sectors versus non-financially dependent sectors. Financial dependence is defined through Compustat as described in the text.

Table 7: Distribution of Entry Sizes in Stacked Specifications of Est. Entry Rates in U.S. Product Markets

	Births by Entry Size Category				Regressions of Birth Entry Size Relative to Max Size in First 3 Yrs
	Births with 1-5 Empl.	Births with 6-20 Empl.	Births with 21-100 Empl.	Births with 101+ Empl.	
	(1)	(2)	(3)	(4)	(5)
	Dependent Variable is Log Establishment Birth Counts by State-SIC2-Type-Year				
Single-Unit Start-Ups Interactions:					
Intra-State Banking Dereg. Fwd. 1-2 Yrs	-0.032 (0.028)	-0.009 (0.032)	-0.037 (0.030)	-0.007 (0.039)	-0.001 (0.008)
Intra-State Banking Dereg. Lag 0-1 Yrs	0.005 (0.032)	-0.056 (0.040)	-0.021 (0.049)	-0.034 (0.051)	0.002 (0.009)
Intra-State Banking Dereg. Lag 2-3 Yrs	-0.099 (0.041)	-0.075 (0.038)	-0.045 (0.043)	-0.110 (0.058)	0.005 (0.007)
Intra-State Banking Dereg. Lag 4+ Yrs	-0.034 (0.036)	-0.067 (0.037)	-0.062 (0.029)	-0.059 (0.048)	0.003 (0.009)
Inter-State Banking Dereg. Fwd. 1-2 Yrs	0.037 (0.029)	0.064 (0.038)	0.032 (0.043)	0.063 (0.046)	0.000 (0.008)
Inter-State Banking Dereg. Lag 0-1 Yrs	0.052 (0.026)	0.096 (0.030)	0.011 (0.036)	0.108 (0.065)	0.002 (0.008)
Inter-State Banking Dereg. Lag 2-3 Yrs	0.114 (0.034)	0.148 (0.040)	0.046 (0.057)	0.138 (0.048)	0.014 (0.008)
Inter-State Banking Dereg. Lag 4+ Yrs	0.148 (0.046)	0.223 (0.042)	0.067 (0.056)	0.097 (0.045)	0.022 (0.011)
Observations	111,894	111,894	111,894	111,894	85,586

Notes: See Table 5. All regressions include cross-sectional State-SIC2-Type and longitudinal Type-Year fixed effects. Regressions further include State-SIC2-Year fixed effects that remove all local conditions common across Types. In these saturated models, the start-up response is estimated relative to facility expansions, and separate coefficients for expansion establishments are no longer estimated or reported. Columns 1-4 repeat the full stacked specification (Column 2 of Table 5) with births in different size categories. Column 5 substitutes the mean ratio of entry size relative to the maximum size achieved in the first three years of operations. These entry size ratios are calculated at the establishment level and are conditional on survival for three years. Unweighted means from the underlying distributions are calculated for each state-industry-type-year cell.

App. Table 1: Timing of State Branch Banking Deregulations

State	Intrastate *de novo* Deregulation	Intrastate M&A Deregulation	Interstate Deregulation
Alabama	1990	1981	1987
Alaska	1970	1970	1982
Arizona	1970	1970	1986
Arkansas	Not deregulated	1994	1989
California	1970	1970	1987
Colorado	Not deregulated	1991	1988
Connecticut	1988	1980	1983
Delaware	1970	1970	1988
District of Columbia	1970	1970	1985
Florida	1988	1988	1985
Georgia	Not deregulated	1983	1985
Hawaii	1986	1986	Not deregulated
Idaho	1970	1970	1985
Illinois	1993	1988	1986
Indiana	1991	1989	1986
Iowa	Not deregulated	Not deregulated	1991
Kansas	1990	1987	1992
Kentucky	Not deregulated	1990	1984
Louisiana	1988	1988	1987
Maine	1975	1975	1978
Maryland	1970	1970	1985
Massachusetts	1984	1984	1983
Michigan	1988	1987	1986
Minnesota	Not deregulated	1993	1986
Mississippi	1989	1986	1988
Missouri	1990	1990	1986
Montana	Not deregulated	1990	1993
Nebraska	Not deregulated	1985	1990
Nevada	1970	1970	1985
New Hampshire	1987	1987	1987
New Jersey	Not deregulated	1977	1986
New Mexico	1991	1991	1989
New York	1976	1976	1982
North Carolina	1970	1970	1985
North Dakota	Not deregulated	1987	1991
Ohio	1989	1979	1985
Oklahoma	Not deregulated	1988	1987
Oregon	1985	1985	1986
Pennsylvania	1990	1982	1986
Rhode Island	1970	1970	1984
South Carolina	1970	1970	1986
South Dakota	1970	1970	1988
Tennessee	1990	1985	1985
Texas	1988	1988	1987
Utah	1981	1981	1984
Vermont	1970	1970	1988
Virginia	1987	1978	1985
Washington	1985	1985	1987
West Virginia	1987	1987	1988
Wisconsin	1990	1990	1987
Wyoming	Not deregulated	1988	1987

Source: Jayaratne and Strahan (1996). Deregulations prior to 1970 are listed as 1970.

App. Table 2: Complete Dynamic Specifications for Table 3

	All Sectors		Adding Linear State Time Trends	
	Single-Unit Start-Ups	Multi-Unit Establish. Openings	Single-Unit Start-Ups	Multi-Unit Establish. Openings
	(1)	(2)	(3)	(4)
	Dependent Variable is Log Est. Birth Counts by State-Year			
Intra-State Banking Dereg. Fwd. 2 Yrs	0.006	-0.049	0.001	-0.045
	(0.023)	(0.029)	(0.019)	(0.030)
Intra-State Banking Dereg. Fwd. 1 Yrs	-0.055	0.003	-0.070	0.004
	(0.041)	(0.027)	(0.041)	(0.033)
Intra-State Banking Dereg. Change	-0.038	-0.016	-0.057	-0.013
	(0.043)	(0.035)	(0.044)	(0.046)
Intra-State Banking Dereg. Lag 1 Yr	-0.047	-0.017	-0.073	-0.027
	(0.048)	(0.057)	(0.053)	(0.062)
Intra-State Banking Dereg. Lag 2 Yrs	-0.061	0.002	-0.085	-0.005
	(0.043)	(0.051)	(0.051)	(0.059)
Intra-State Banking Dereg. Lag 3 Yrs	-0.023	0.029	-0.049	0.014
	(0.039)	(0.043)	(0.060)	(0.060)
Intra-State Banking Dereg. Lag 4+ Yrs	-0.029	0.006	-0.067	0.010
	(0.050)	(0.051)	(0.058)	(0.065)
Inter-State Banking Dereg. Fwd. 2 Yrs	0.008	-0.019	0.035	-0.019
	(0.032)	(0.027)	(0.034)	(0.024)
Inter-State Banking Dereg. Fwd. 1 Yrs	0.062	-0.018	0.099	-0.012
	(0.041)	(0.031)	(0.042)	(0.031)
Inter-State Banking Dereg. Change	0.043	0.003	0.078	-0.004
	(0.036)	(0.035)	(0.035)	(0.034)
Inter-State Banking Dereg. Lag 1 Yr	0.106	0.012	0.144	-0.001
	(0.036)	(0.032)	(0.039)	(0.036)
Inter-State Banking Dereg. Lag 2 Yrs	0.168	0.067	0.206	0.050
	(0.041)	(0.036)	(0.047)	(0.039)
Inter-State Banking Dereg. Lag 3 Yrs	0.226	0.112	0.263	0.088
	(0.047)	(0.036)	(0.058)	(0.048)
Inter-State Banking Dereg. Lag 4+ Yrs	0.258	0.144	0.278	0.098
	(0.060)	(0.049)	(0.078)	(0.067)

Notes: See Table 3.