

# Where Are All The New Banks? The Role of Regulatory Burden in New Charter Creation

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The number of new bank charters in the United States has declined dramatically in recent years. From 1990 to 2008, 1,850 new banks were formed, a rate of nearly 100 per year. From 2010 to 2012 only 5 new banks were formed, a rate of fewer than 2 per year. The cause of the decline is not immediately obvious, but two leading theories – with rather different policy implications – have been put forward. Some have suggested that the decline is due to increased regulatory burden on banks – including new FDIC regulations and the 2010 Dodd Frank Act. Others have suggested that the weak economy – with its associated weak demand for banking services and low interest rate environment – are depressing bank profits. The former case may be of more concern to policymakers than the latter. This paper assesses the causes of the drop in new charter creation. We model firms' new charter decisions at the county level with an ordered probit using U.S. data from 1995 to 2012. The results suggest that a substantial portion (perhaps up to 90%) of the decline in new bank formation is attributable to the low interest rate environment and weak demand for banking services. This suggests a rather small role for the effects of increased regulatory burden on banks. It is less clear whether regulation will play a role when the economy returns to more robust state.

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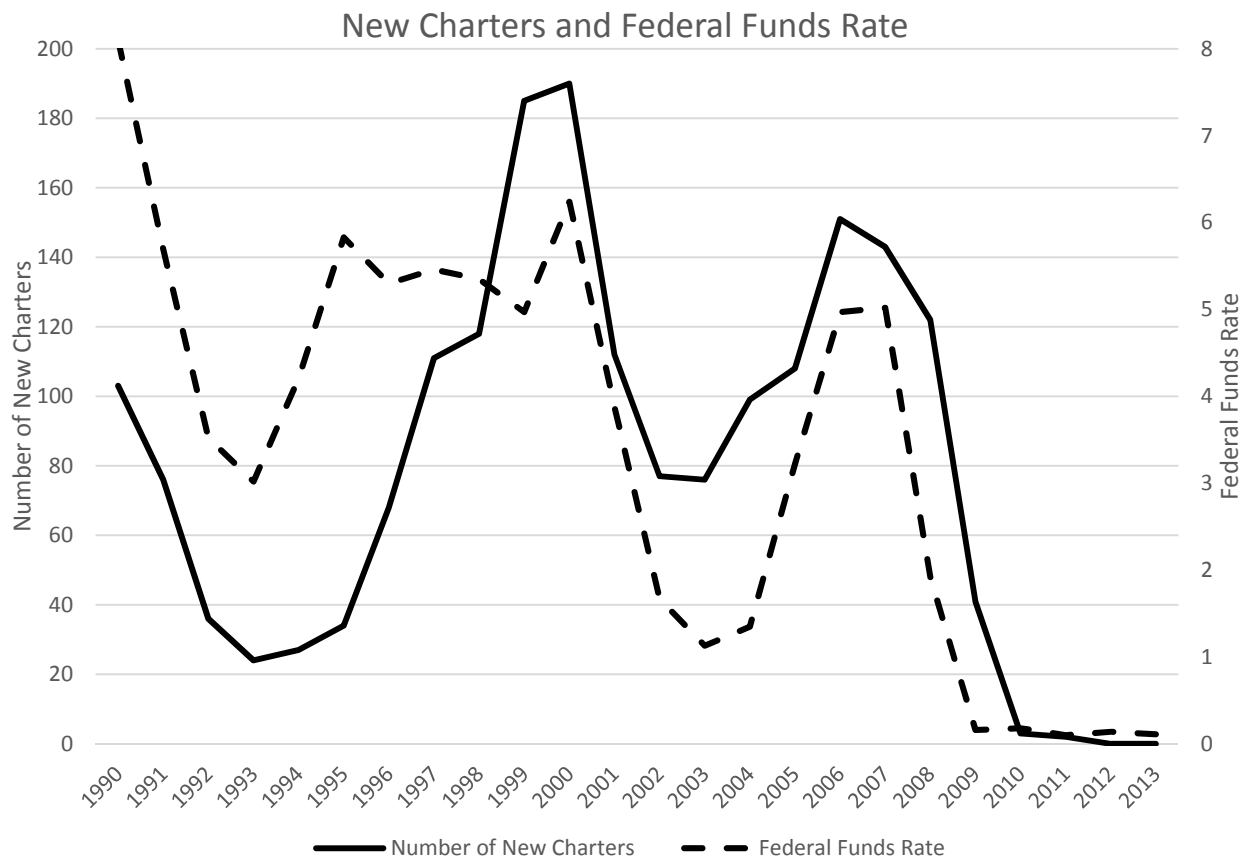
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## 1. Introduction

The number of new bank charters in the United States (the solid line in Figure 1) has dropped dramatically in recent years. From 1990 to 2008, nearly 100 new bank charters were formed each year on average. Some years saw the formation of nearly 200 new institutions. From 2010 to 2012, however, only 5 new charters were formed.

Figure 1



This dramatic reduction in new bank charters could be a concern for policymakers if the decline has been caused – as some have suggested – by increased regulatory burden in response to the financial crisis of the late 2000's. Numerous regulations have been passed since the financial crisis, including increased capital and liquidity standards instituted by the Basel Committee, increased regulatory compliance stipulated by the Dodd Frank Financial Reform Act, and new rules for mortgage lending

instituted by the Consumer Financial Protection Bureau. Collectively these regulations – and uncertainty around their interpretation, enforcement, and future extension – may have depressed banking profits (and with therefore new bank supply) to inefficiently low levels.<sup>2</sup>

Other factors, however, may have contributed to the decline in new bank charters. In particular, the macro economy has been weak since the financial crisis, which has at least two relevant effects. First, the weak economy has introduced a low interest rate environment (the dotted line in Figure 1), which diminishes banks' ability to earn spread interest. Interest rates correlate very strongly with new entry, as seen in Figure 1. Second, in a weak economy households and businesses may have depressed demand for banking services such as loans and deposit-taking services. If the weak economy is responsible for the decline in new charters there may be less cause for concern on the part of policymakers. A decline in banking demand is among the most innocuous explanations for a decline in new supply.

This aim of this paper is to understand how much of the decline in new bank formation is attributable to increased regulatory burden since the financial crisis versus other observable factors such as the weak economy with its low interest rates and weak banking demand. To shed light on this question we estimate a model of new bank entry using observable, time- and geographic-varying determinants of prospective banking profit including income, GDP growth, population growth, and interest rates. We use the model to predict the level of new bank formation that would have occurred absent any regulatory changes post-crisis, and compare the model's predicted levels of bank formation to the actual level of bank formation.

We find that nearly all of the current decline in new charters is attributable to observable factors related to the weak economy, leaving little room for the role of regulation and other unobservable factors. Our results suggest that as much as 90% of the current decline in new charters is attributable to weak demand and low interest rates, leaving no more than 10% attributable to regulatory burden and other unobservable factors.

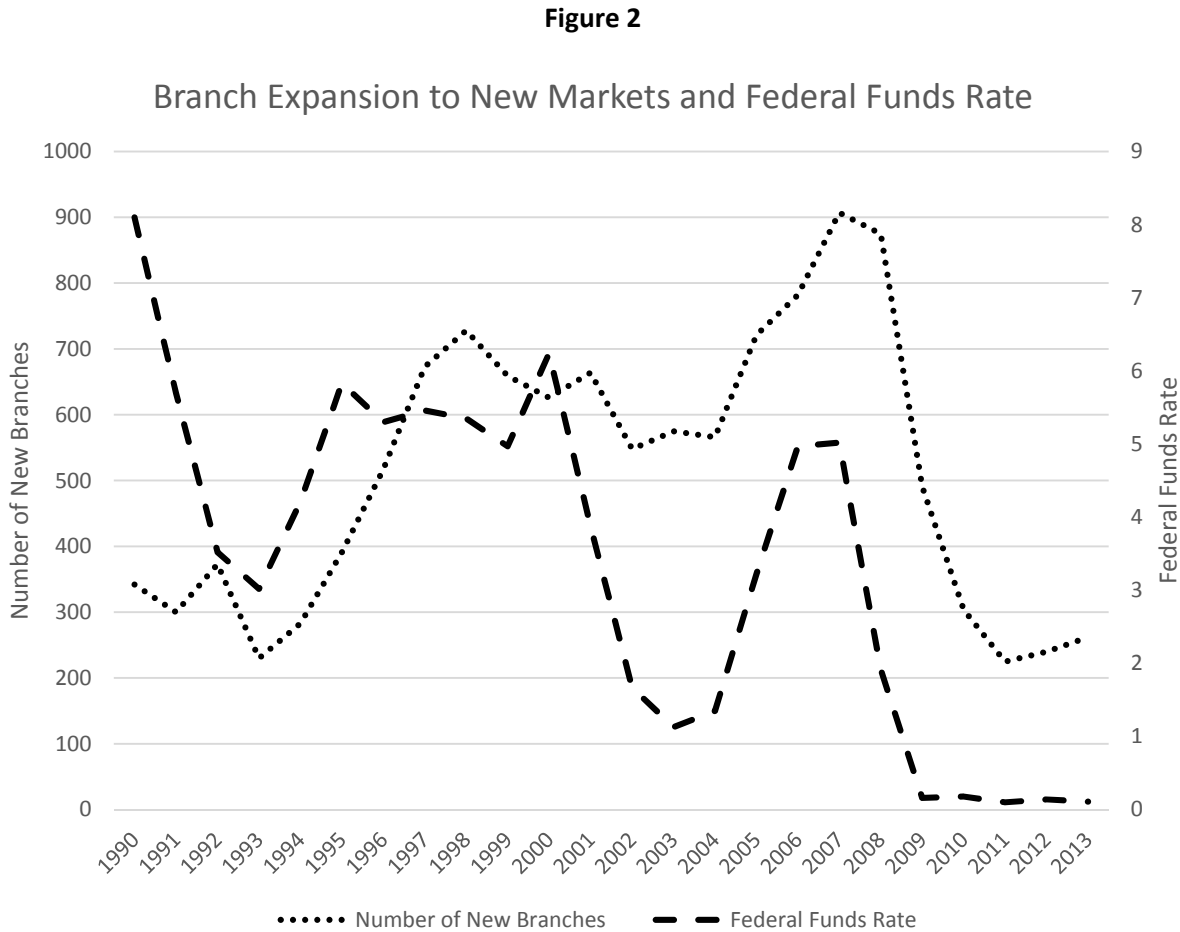
It is unclear from the model whether regulation will play a dampening role on entry once macroeconomic conditions return to healthier levels. Some specifications suggest that regulation may,

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<sup>2</sup> A prominent manifestation of these opinions was Senator Pat Toomey's comments at Federal Reserve Chair Janet Yellen's Senate Confirmation hearing. Senator Toomey specifically attributed the lack of new charters to increased regulatory burden in recent years and asked the future Chair to address the issue.

but these specifications predict further out-of-sample than our baseline results, so the less speculative conclusion relates to the current state of the economy.

It is worth noting that the other form of bank entry – branch expansion by existing banks into new geographic markets – has also taken a similar plunge in recent years (Figure 2)



There are two implications of this. First, the lack of new bank charters is not simply being substituted by existing bank expansion. Both are part of a common trend.<sup>3</sup> Second, the decline in expansionary activity would seem to confirm – or at least not contradict – the regression results suggesting that the economy (rather than regulation) is depressing prospective banking profits. Branch expansion is likely to

<sup>3</sup> At the national, annual level, the correlation between new entry and expansionary entry is .93.

be less affected by regulation than new charter formation is,<sup>4</sup> so the dip in branch expansions is consistent with the notion that non-regulatory factors are at play.

The remainder of the paper proceeds as follows. Section 2 discusses the existing literature on bank entry and profitability. Section 3 discusses background on new charter formation and recent trends in banking profitability. This descriptive evidence begins to shed light on the potential sources of the compression in bank profits and the associated decline of new entry. Section 4 discusses our model of new banking entry, and Section 5 discusses the data we use to estimate the model. Section 6 describes our results, including discussions of alternative specifications and robustness checks. Section 7 concludes.

## **2. Literature**

The literature on new charter creation has focused largely on entry into local banking markets, the factors that lead to greater or lower probability of entry, and competitive outcomes. Since banking has been and continues to be local in geographic scope, local market conditions are generally used in the analysis. Determinants of profitability and entry used in these studies have included market growth, market concentration, and recent merger activity.

One of the earliest studies, Hanweck (1971) considered new charter formations in 1968 and 1969. He found that larger and less concentrated banking markets had significantly more charter formations. Such a result is consistent with most models of entry, including ones with heterogeneity in cost and productivity. Other early papers include Boczar (1975) and Rosse (1977), who focus on very restrictive samples from Florida and Texas respectively.

More recent studies that only focus on new charter formation include Seelig and Critchfield (2003), Berger et al (2004), and Keeton (2000). These studies focus on new charter formations in urban markets and the effects of mergers. They find that greater merger activity is associated with greater subsequent entry. They also found that better local market demand conditions were associated with greater entry.

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<sup>4</sup> Because some regulations may affect fixed decisions (such as new charter formation) rather than marginal ones (such as branch expansion).

Two studies, Amel and Liang (1997) and Adams and Amel (2007), consider both branch expansion and new charter formation. Again, the focus of these studies is bank competition and local market determinants of entry. Amel and Liang focus on bank profits and entry in a few thousand banking markets from 1997-88.<sup>5</sup> They find that local population, population growth, and high incumbent profits are strong determinants of entry. Adams and Amel estimate a reduced form model of bank entry from 1994 to 2008. Their paper likewise includes measures of local market demand conditions, but also includes past entry and strategic variables. They find that local market demand conditions are correlated with higher entry probabilities, and that incumbent bank branch expansion and small bank presence deter entry. Contrary to the predictions of some static entry models, they find that past entry correlates positively with future entry, suggesting a role for market-specific, auto-correlated unobservables.

Cohen and Mazzeo (2007) estimate a static, single period, cross sectional Nash Equilibria across various geographic markets. They model aggregate entry decisions on aggregate profitability determinants, while we model new entry decisions (entry “deviations”) on changes in profitability determinants (profitability “deviations”). They find that banks within bank types (thrifts, single market banks, and multi-market banks) compete more intensely than banks of different types.

### **3. New Charter Formation and Trends in Banking Profitability**

#### **3.1 New Charter Formation**

To begin accepting deposits, banks are required to obtain insurance from the Federal Deposit Insurance Corporation (FDIC) and to submit to the authority of a primary federal regulator. Banks may open new charters either at the national level – in which case their primary federal regulator is the Office of the Comptroller of the Currency (OCC) – or at the state level – in which case the primary federal regulator is the Federal Reserve Board (FRB, for “member” banks) or the FDIC (for “nonmember” banks).

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<sup>5</sup> Amel and Liang have measures of bank profit that are more closely tied to local demand conditions, due to the substantial state branching restrictions that existed at the time of their sample. Such an analysis is less viable on a later data sample because the majority of banking assets are now held by companies that span multiple markets and states.

The capital requirements for a new bank appear to depend on geography. Georgia requires \$3M in initial capital; New Jersey \$6M. New York, California, and the OCC appear to evaluate capital plans on a case-by-case basis, though New York indicates that it may require up to \$50M in initial capital to start a successful bank in the New York City metropolitan area.<sup>6</sup> Once a charter is approved, it does not normally take long for a retail presence to be established. Indeed some charter-granting institutions require a physical branch to be opened shortly after a charter is granted in order to avoid charter expiration. In 2,000+ new charters in our data from the last 18 years, all new charters except for one were accompanied by a bank branch in the same year.

New charters have a number of characteristics that make them unlike incumbents (Figure 3).

**Figure 3: Characteristics of New Charters and All Banks**

	New Charters	All Banks	
Assets (mean)	\$34,179	\$984,850	
	(med)	\$26,629	\$106,944
	(max)	\$365,540	\$1,610,000,000
	(min)	\$3,454	\$989
Deposits	\$22,899	\$662,356	
	\$17,042	\$91,016	
	\$299,245	\$1,060,000,000	
	\$0	\$0	
Net Interest Margin <sup>1</sup>	1.2%	1.8%	
	1.2%	1.8%	
	-0.6%	-9.0%	
	6%	30%	
Net Non-Interest Margin <sup>2</sup>	-3.0%	-1.1%	
	-2.5%	-1.1%	
	17.7%	37.6%	
	-37.0%	-52.1%	
Single-Market Bank	0.98	0.67	
	1	1	
	1	1	
	0	0	
Real Estate Loans/Assets	11.2%	26.7%	
	7.7%	22.1%	
	95.0%	97.8%	
	0.0%	0.0%	
C&I Loans/Assets	10.5%	8.4%	

<sup>6</sup> Filing fees appear to be modest relative to initial capital levels. Georgia's fee is \$10K and New Jersey's is \$15k.

	8.1%	6.8%
	52.8%	85.1%
	0.0%	0.0%
Consumer Loans/Assets	3.5%	6.4%
	1.8%	4.8%
	58.4%	99.6%
	0.0%	0.0%
Percent Rural	14.7%	22.8%
Percent Micropolitan <sup>3</sup>	5.3%	1.3%
Percent MSA	80.0%	75.8%
N	1906	202,982

All dollar amounts are in thousands of dollars.

<sup>1</sup> [ (Interest Revenue) - (Interest Cost) ] / Assets

<sup>2</sup> [ (Non-Interest Revenue) - (Non-Interest Cost) ] / Assets

<sup>3</sup> Core urban population of 10,000 - 50,000.

First, new charters are significantly smaller, both by assets and deposits, than incumbents. They earn smaller margins on both their interest operations and non-interest operations, and are more likely to be a single market competitors. They have different loan portfolios, being relatively more dependent on commercial & industrial (C&I loans) rather than real estate and consumer loans. They are somewhat less likely to locate in rural areas, which is consistent with the findings of Hanweck (1971) and may be explained by a number of factors including greater growth potential.<sup>7</sup>

Despite entrant banks' small size they do not appear any more likely to fail than older banks. For example, during 2006 – 2013, the proportion of '01-'05 charters that failed (12.2%) is not statistically different from the proportion of '96-'00 charters that failed (10.7%).

### 3.2 Trends in Banking Profitability

Trends in banking profitability help shed light on whether cost (regulation) or demand (demographic and interest rate) variables may be playing a greater role in diminished banking profits and thus reduced banking entry. Figure 4 charts (and provides tabular information on) the correlation between the

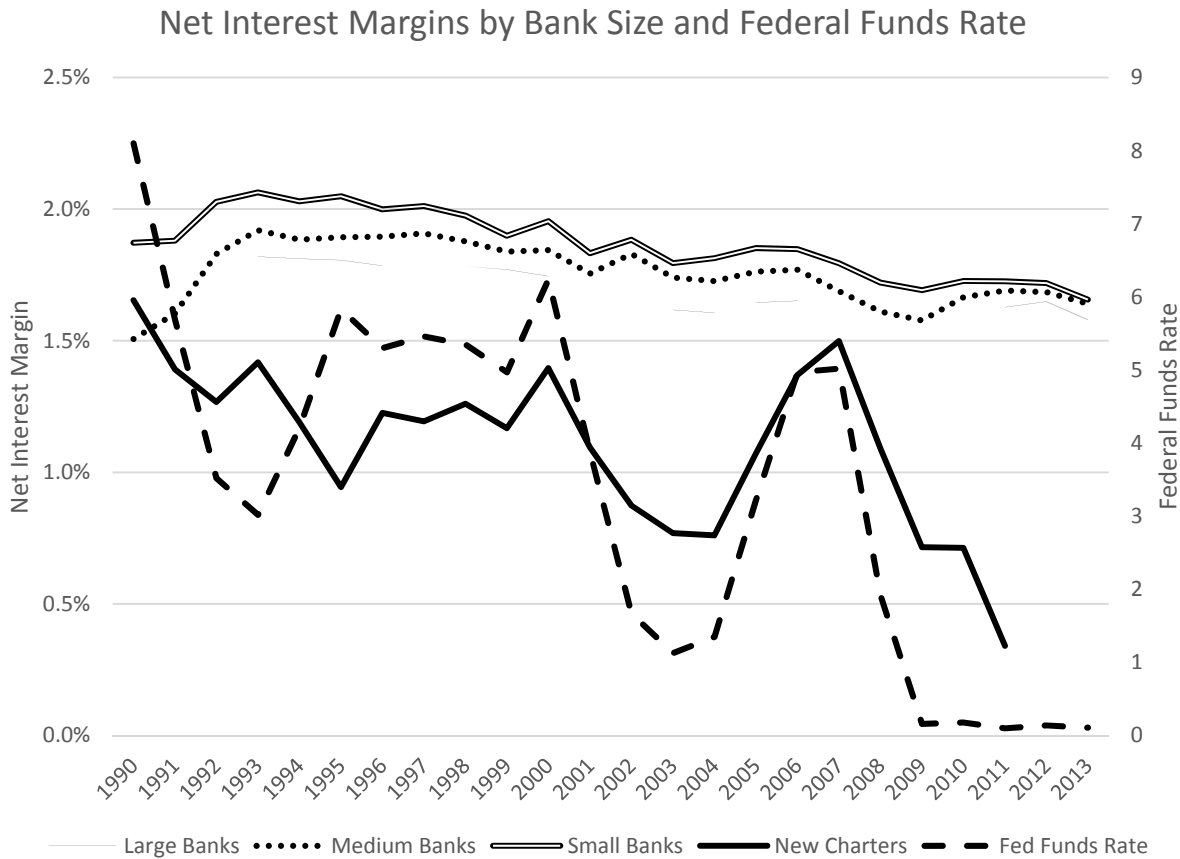
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<sup>7</sup> Other studies have also found differences between entrants and incumbents, both in banking contexts and in other markets. Adams and Amel (2007) find that community banks compete more aggressively than national banks do in rural markets. Cohen and Mazzeo (2007) find that competition between banks of similar types (thrift, single market, or multi market) is stronger than competition across groups, suggesting differentiation. Foster, Haltiwanger, and Syverson (2008) document that in certain manufacturing industries entrants are more productive than incumbents on average.



Federal Funds Rate and the Net Interest Margins of various banks sizes and classes. Net Interest Margins are defined as interest revenue minus interest costs divided by total assets, and the values charted and correlated are median values in public regulatory filings. Large banks are those with \$1B or more in assets, small banks are those with \$250M or less.

**Figure 4**

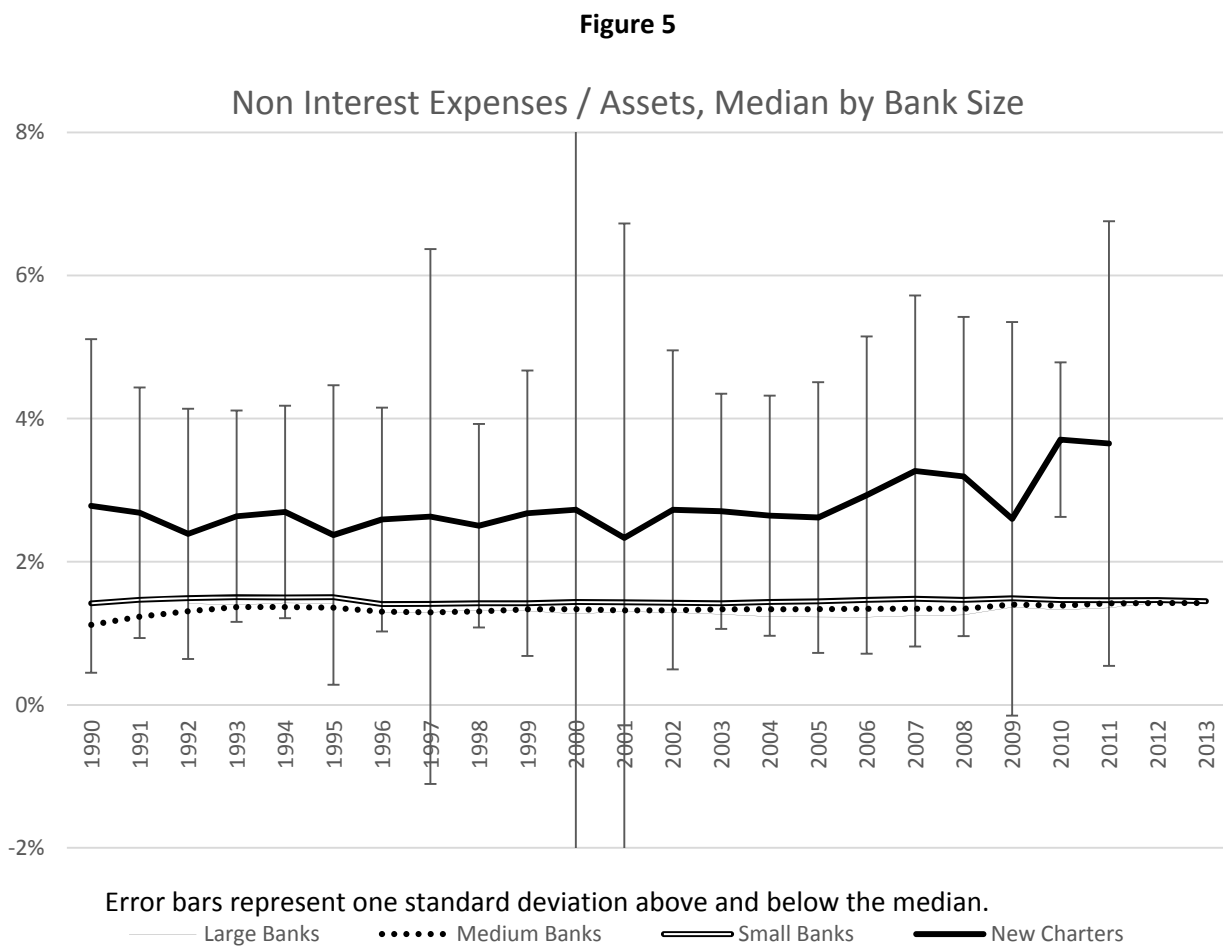


<b>Correlation of Median Net Interest Margin with Federal Funds Rate</b>	
New Charters	0.8371***
Small Banks (<\$250M, 75% of obs)	0.6760***
Medium Banks (\$250M - \$1B, 19% of obs)	0.2877
Large Banks (>\$1B, 6% of obs)	0.1359
Correlations are of Annual Series	
***<0.01, **<0.05, *<0.1	

In addition to being lower, entrant banks' interest margins are far more tied to the Federal Funds rate than are the interest margins of incumbent banks. The correlation of entrant banks' interest margins and the federal funds rate is .83, a significantly higher correlation than for incumbent banks of any size.

One reason entrant banks' interest margins may be so strongly correlated with the current interest rate is that entrant banks do not have an existing stock of loans on which they collect previous periods' rates. Incumbent banks, in contrast, receive interest payments which are, to some extent, determined by historical interest rates. In light of Figure 4, it may not be surprising that would-be new charters are reluctant to form during low interest rate regimes.

Figure 5 gives a view of the non-interest side of banks' operations. The figure displays non-interest costs as a percentage of assets for various bank sizes and for entrants. Vertical bars represent one sample standard deviation above and below the median value.



If new regulations were introducing compliance costs – such as hiring new staff, consultants, or compliance software, etc. – then we may expect to see these series rising. However, no such pattern is obvious. Incumbent banks non-interest cost to asset ratios have change little at all, and entrant banks' ratios are only slightly higher than they were in 2007. Of course regulation may work through the

interest margin or may not yet have taken tangible effect, but nonetheless Figure 5 shows no obvious marks of escalated regulatory burden on banks. We now turn to our model and estimation for more systematic inference on the cause of the decline in new bank charters. .

#### 4. Model

Decisions by prospective entrants to apply for a new charter in a particular geographic area are determined by expected bank profits in that area. The determinants of profits are the interest rate environment, the geography's demographics (population, income, employment, etc.), changes in these demographics, regulation, and the local competitive environment. Potential entrants choose to enter a local geographic market if the profitability of doing so is greater than the profitability of not doing so, the later profitability of which is normalized to zero. The potential entrants' problem, then, is:

$$\begin{aligned} & \text{Max} (\pi_{mt}^E, \pi_{mt}^{NE}) \text{ where} \\ & \pi_{mt}^E = \beta_1 X_{mt} + \beta_2 i_{mt} + \beta_3 r_{mt} + \varepsilon_{imt} , \\ & \pi_{mt}^{NE} = 0 \end{aligned}$$

The choices  $\pi_{mt}^E$  and  $\pi_{mt}^{NE}$  are, respectively, to enter or not enter market  $m$  at time  $t$ .  $X_{mt}$  represents a vector of local demand variables such as income, population income growth, population growth and changes in those variables.  $i_{mt}$  is the average federal funds rate in year  $t$ .  $r_{mt}$  is a vector of risk variables in a geography such as consumers' average credit scores and number of delinquencies in the particular area.  $\varepsilon_{imt}$  is normally distributed and i.i.d. across potential entrants  $i$ , markets  $m$ , and time  $t$ .

Because firms choose to enter if  $\pi_{mt}^E > \pi_{mt}^{NE}$ , entry at the county level is observed according to:

$$NewCharter_{mt} = \begin{cases} 1 & \text{if } X_{mt} + \beta_2 i_{mt} + \beta_3 r_{mt} + \varepsilon_{mt} > 0 \\ 0 & \text{else} \end{cases}$$

Despite entry being a dynamic, forward-looking decision, we do not attempt to model potential entrants' beliefs over the values of future state variables. Our model corresponds to a world in which current state variables (for instance, interest rates and demographics) are sufficient statistics for firms' information on the future values of these state variables. Demographic and interest rate variables tend to change slowly and in systematic ways, so this assumption does not seem implausible to the authors.

The model also does not model beliefs over other firms' potential entry or exit decisions. This is one possible extension of the model, but one that authors do not believe will alter the results significantly. While such a model would allow one to predict entry responses in a variety of counterfactual states of the world, it is less clear that such a model enhances inference on the cause of the current decline in new entry.

We do not include any direct measures of regulation's effect in potential entrants' profit functions. We have considered using direct measures of regulation – such as required capital ratios, pages of banking legislation, or timing of key pieces of legislation – but we judged them to be too coarse and imprecise to be useful. This is especially true because some have suggested that the current regulatory effect is not only *passed* legislation but also uncertainty over future extension or enforcement of legislation. In such a context it seems implausible to include regulatory regressors, and we instead draw inference on would-be regulatory effects from variation in new charters that is unexplained by other observables. Our one attempt to directly proxy for “regulation” is by including a post-2009 dummy in some specifications, though of course this regressor could absorb any number of things that change after 2009 besides than regulation.

We model bank competition at the local geographic level. Despite the existence of national banks that compete across many geographic markets, retail banking requires proximity to a service provider for certain transactions (albeit not all transactions). Both antitrust enforcement agencies – the DOJ and the Federal Reserve Board – consider retail banking markets to be local, and all previous studies to our knowledge consider competition to occur at the local level.<sup>8</sup>

We use the county as the level of observation in our preferred specification, rather than the slightly broader (in some cases) definitions used by regulatory authorities. We do this to take advantage of the finer data that we have for both new charters and demographics. Bank branching decisions tend to focus more on immediate service areas of the branch rather than entire metropolitan statistical areas, for example. By using counties for the new charter decision we aim to match this feature of branching decisions.

Our estimation equation is:

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<sup>8</sup> See Group of Ten (2001) for further discussion.

$$NewCharter_{mt} = \beta_1 X_{mt} + \beta_2 i_{mt} + \beta_3 r_{mt} + \varepsilon_{mt}$$

where  $NewCharter_{mt}$  in county  $m$  and time  $t$  is defined as (0,1) in the case of a standard probit or the number of new charters in the ordered probit case.<sup>9</sup> We anticipate the regression results to indicate that higher federal funds rate and more robust local demographic variables lead to greater new charter creation, while increased risk factors lead to lower new charter creation.

## 5. Data

New charter data is constructed from the Summary of Deposits (SOD) and the National Information Center (NIC). The SOD is an annual branch level survey (of, among other things, deposits) taken on June 30 of each year. The NIC data matches bank entities with their respective holding companies and also tracks the evolution of bank entities over time. This allows us to classify new branches in each year as either acquisitions or expansions by existing firms, or as new charters. New charters created by already existing bank holding companies are not counted as new charters, but rather as branch expansion by an existing institution. However, since the SOD is a mid-year report, the number of new charters in a county in our data is actually the number of new charters established between July 1 of the previous year and June 30 of the current year. Data are at the county level.<sup>10</sup>

Federal funds rate and the ten year U.S. Treasury come from the Federal Reserve Bank of New York and U.S. treasury, respectively, and represent annual averages.

County-level demographic variables are pulled from the Bureau of Economic Analysis (BEA), Bureau of Labor Statistics (BLS), and United States Census. The BEA provides data on population and per-capita income at their mid-year estimated levels dating back to 1990. The BLS provides weighted averages of the monthly unemployment rates each year dating back to 1988. The Census provides the land area of

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<sup>9</sup> Results change very little between the two models. Fewer than 10% of counties see any entry and fewer than 1% see multiple entrants.

<sup>10</sup> We have pulled some market concentration data from the June 30 Call Reports which contain information such as deposits and assets for each banking entity. These data enable us to classify banking organizations by size, as well as to calculate HHIs, though we do not use HHIs in our model of entry. In calculating rural counties' HHIs, we exclude urban branches with greater than \$1 billion in deposits and rural branches with greater than \$500 million. We do this because banks sometimes funnel deposits into certain branches for legal or tax purposes. For example, if a large bank stores \$1 billion of deposits in a small but competitive rural county, an unadjusted HHI would be a poor measure of how competitive that banking market actually is.

each county which is used to calculate population densities. We calculate annual percentage changes in population and per-capita income and annual absolute changes in population, per-capita income, and unemployment rates.

We also make use of private vendor data purchased from Equifax pertaining to credit history in each county from 1999 until 2012. This data includes the average credit scores and number of credit inquiries over the course of a year conducted by third parties on a random sample of residents. Additionally, it includes the share of each county that has at least one account which is currently 60 days delinquent as of December 31. The universe of this dataset is all people with credit history and social security numbers ending in certain digits.<sup>11</sup>

Figure 6 presents some summary statistics from the data. Recall that the interest rate variables do not vary by county, but the other variables do.

**Figure 6: Summary Statistics**

	Obs	Mean	Median	Min	Max	S.D.
Federal Funds Rate*	39712	2.31	1.67	0.1	6.24	2.05
Treasury Note*	39712	4.03	4.27	1.8	6.03	1.04
Treasury Note (10 Year) - FFR*	39712	1.72	1.74	-0.39	3.1	1.28
% Change Population*	39712	0.46	0.33	-21.6	22.94	1.53
Population**	39712	95.59	25.63	0.42	9889	306.8
People Per Square Mile**	39712	0.24	0.04	0	70.35	1.71
Per Capita Income**	39712	10.33	10.31	9.33	11.76	0.22
Unemployment Rate*	39712	6.12	5.5	0.7	30.6	2.76
Change Number Unemployed**	39712	0.19	0.01	-53.31	193.7	2.21
Mean Credit Score	39712	685.5	688.9	580.4	772.3	27.84
Mean Inquiries	39712	1.5	1.41	0.21	3.98	0.59
Delinquency Rate*	39712	1.9	1.82	0	13.04	0.9
Change Mean Credit Score	39712	1.28	1.39	-29.14	35.56	3.09
Change Mean Inquiries	39712	-0.03	-0.01	-1.33	1.34	0.18
Change Delinquency Rate*	39712	-0.04	-0.02	-11.11	11.11	0.88
HHI	39712	3134	2515	324.8	10000	2085
% Small Bank Deposits*	39712	58.06	60.99	0	100	33.26
Post 2009	39712	0.23	0	0	1	0.42

\* denotes a 0-100 scale.

\*\* denotes thousands.

<sup>11</sup> We also have HMDA data which we are not currently using. This data counts the number of applications and approvals for mortgages in each county.

## 6. Estimation Results

In our analysis, we estimate two specifications. In the first specification, we estimate the model using data from before Dodd-Frank (2000-2008) and then predict out of sample how many new charters would occur from 2009-2012. In the second specification, we estimate the model using the full sample from 2000 through 2012 and include a dummy variable for the post financial crisis period to directly capture the effect of regulation. In both specifications, we run an ordered probit model on county-level data, where the dependent variable is the number of new charters in a county in a year. The regression results are displayed in Figure 7.

Figure 7

Specification	(1)	(2)
Geographic Observation	County	County
Regression Type	Ord Probit	Ord Probit
Sample Start	2000	2000
Sample End	2008	2012
N	27,719	40,043
R2	0.2690	0.3020
ln_fedfunds	0.0828*	0.0663**
ln_tnote10yr	0.6517***	0.7293***
ln_pop	0.5060***	0.4995***
p_c_pop	0.0525***	0.0518***
popdensity	-0.0091*	-0.0065
percapitainc	0.0116***	0.0107***
c_percapitainc	-0.0049	-0.0077
unemp_rate	-0.0240*	-0.0224*
mean_credit_score	-0.0005	0.0008
mean_inquiries	0.2455***	0.2676***
delinq_rate	-0.0564	-0.0391
post2009		-0.9997***
Const (cut1 if Ord Prob)	8.8923***	9.8624***
2006 pred (actual = 153)	159	157
2007 pred (actual = 147)	162	159
2008 pred (actual = 122)	105	104
2012 pred (wo reg effect)	18	16
Non-reg eliminates all but...	11%	10%
2007 pred (w reg effect)	.	23
Reg eliminates all but...	.	14%

In the first specification, the results give us the expected signs for most of the coefficients with most variables being significant. Both the Federal Funds Rate (FFR) and the 10-year Treasury note positively influence new charter creation.<sup>12</sup> While the FFR coefficient is only significant at the 10 percent level, the 10 year Treasury note coefficient is significant at the 1 percent level. Population, population growth, and per capita income are all positive and significant at the 1 percent level. Population density and per capita income growth are both negative. Population density is significant at the 10 percent level and per capita income growth is insignificant. Unemployment has the expected negative sign and is significant at the 10 percent level. Both mean credit score and delinquency rate are negative and insignificant. The number of inquiries is positive and significant at the 1 percent level. The R-squared is approximately 0.27.

In the second specification, most signs of coefficients do not change substantially, and are still expected and significant. The R2 of the regression is approximately 0.30. The post-july-2009 dummy variable and the sample period are the two changes in this specification. The dummy variable – which is ascribed a negative coefficient by the estimation routine – is our only attempt to capture effects of any post-crisis regulation, though it will of course capture any other omitted variables or unobserved structural breaks that occurred in 2009, as well. We use July 2009 as the cutoff since the Dodd-Frank Act was initially proposed in June 2009 even though it was not signed into law until July 21, 2010. We have estimated robustness checks with alternative start dates with little effect on the results.

We run several other specifications as robustness checks, as well. The specifications include different models (ordered probits, probits, and OLS regressions), levels of geographic aggregation (counties and states), sample start (2000, 1995), one and two year lags of demographic regressors, and different sets and functional forms of regressors. Regressions starting in 1995 have more observations but fewer regressors as our consumer credit series only begin in 2000. None of these specifications alter the results in any substantial or meaningful way.<sup>13</sup>

We now turn to the main focus of our analysis. The bottom portion of Figure 7 displays model predictions of new charters in order to decompose the current decline. The panel displays the model's

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<sup>12</sup> We have specifications in which we use the yield curve (ten year note minus FFR), but the 10-year note itself seems to perform slightly better in predicting entry.

<sup>13</sup> The regression results from these alternative specifications are available from the authors upon request.



predicted number of new entrants in 2006, 2007, 2008, and in 2012 assuming no effect from regulatory change.

Focusing first on specification #1, the model predicts 159, 162, 105, and 18 new entrants (compared to actuals of 153, 159, 104, and 0). The 11% number, highlighted, represents 18/159, which is the portion of the decline in actual new charters that the model (with no regulatory effect) fails to explain. An interpretation of the 10% is that it is an upper bound on the proportion of the new charter decline left to be explained by unobserved factors which include – among other things – regulation. Such an interpretation assumes that there is no omitted variable bias, for instance past periods of low interest rates and weak demand having induced (or at least been correlated) with new banking regulations. In such a case the model would misattribute declines in new entry to rates and demand rather than regulation. Such an interpretation also assumes that the regression relationship holds near the edge of the observed sample range of interest rates. We have tried various functional forms of the interest rate (including a linear regressor which would be expected, if anything, to understate rates' effect on bank profitability) with very little change to the regression results and predictions.

In the second specification, which includes our attempt to directly proxy for regulation with a post-2009 dummy, the model still predicts a very large current decline in new charters due only to interest rates and demographic variables. It predicts that all but 11% of the current decline is being caused by the interest rate, demographic, and risk variables. However, the model also predicts that the post-2009 fixed effect itself could explain all but 11% of the current decline in new charters (assuming other regressors were set back to 2007 levels). In principle, such an estimate could be interpreted as implying that regulation will play a dampening role on new charter formation at such time as economy becomes more robust. However, this relies on an out-of-sample prediction – high interest rates and a robust economy have not been observed since the financial crisis – so it is hard to place confidence in such a conclusion.

## **V. Conclusion**

The lack of new charter creation has been a topic of interest in the public press and a source of concern about the potential for inefficient government regulation. This paper attempts to understand which factors have led to the marked decline in new charters. Regression results suggest a very strong relationship between certain determinants of bank profits – namely interest rates and banking demand metrics – and new bank charter formation. It would appear that a substantial portion of the recent

decline in new bank charters may have occurred without any post-crisis regulatory changes. Our analysis points to a potential effect of the current low interest rate environment fostered by the Federal Reserve – the deterrence of new bank entry. An assessment of the broader welfare impacts of this effect is beyond the scope of this study, but no doubt an open and important question.

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