Bank Expansion after the Riegle-Neal Act: 
The Role of Diversification of Geographic Risk

Victor Aguirregabiria*  Robert Clark*  Hui Wang*
University of Toronto  HEC Montreal  University of Toronto

February 12, 2010

Abstract

The Riegle-Neal Act in 1994 established the conditions for the removal of restrictions on interstate banking and branching in US. One of the primary motivations for enacting this act was permitting banks to diversify geographic risk. The purpose of this paper is to study the role of diversification of geographic risk as one of the motives for bank expansion during the period 1994-2006. We propose and estimate a game theoretic model of banks’ decisions to operate branches in local markets. A key feature of the model is that a bank’s decision of where to operate branches is modeled as a portfolio choice between risky assets. The returns to a bank’s investments in a local geographic market (e.g., loans to local business and households) have a risk component that is specific of the local market. A bank is concerned with both the aggregate expected return and the aggregate risk of its portfolio of geographic markets. To estimate this model, we construct a dataset that combines information from four different sources: branch and deposits data from the FDIC database; information on mergers/acquisitions from the Chicago Fed; a detailed and comprehensive description of the timing of adoption of the Riegle-Neal Act in different states; and Census Bureau county-level data on population, income and industry composition.

Keywords: Riegle-Neal Act; Commercial Banking; Market entry models; Geographic risk; Risk diversification.

JEL codes: L13, L51, G21

Corresponding Author: Victor Aguirregabiria. Address: 100 St. George Street. Toronto, ON, M5S 3G7. Phone: (416) 978-4358. E-mail: victor.aguirregabiria@utoronto.ca

*We have benefited from comments and discussions with Angelo Melino, Tom Holmes, and Ali Hortacsu.
1 Introduction

The US banking industry is much more fragmented than elsewhere, composed of many small, locally concentrated banks. A key factor in explaining this market structure is the history of stringent restrictions on banks’ ability to expand geographically, both within and across states, and either through merger/acquisition or the establishment of new branches. In part because the historical rash of failures of small community banks and thrifts during the 1970s and 1980s, there was a move towards the elimination of restrictions on geographic expansion for banks. This trend culminated in 1994 with the passage of the Riegle Neal Interstate Banking and Branching Efficiency Act, which set the table for the removal of restrictions on interstate banking and branching. By 1994, all states save Iowa already allowed intrastate branching via merger and acquisition, and all but twelve states allowed intrastate branching via de novo branch creation. Therefore, the most important change to come out of Riegle-Neal was that it permitted interstate branching. Unless a state explicitly opted out, it was required to permit interstate branching by merger/acquisition as of June 1st 1997, and states could opt-in prior to this date. States could also opt-in to de novo branching. Despite this important trend towards deregulation, the geographic structure of bank networks today is not dramatically different to the one in 1994. The US banking industry is still more fragmented than elsewhere: in 2007, there were more than 8,500 commercial banks (there were more than 10,000 in 1994), most of them very small and concentrated in narrow geographic regions.

In this paper we study branch-network expansion following the passage of Riegle Neal. Despite the rise of the internet, branching is still the most important tool that banks have to capture deposits and loans. In order to increase its market share of deposits and loans, a bank should expand its branch network. As in other retail networks, we expect economies of scale, economies of density, and sunk entry costs to play important roles in influencing the size, the spatial configuration, and the dynamics of branch networks. For retail banking, an additional factor that is often mentioned as important in determining the optimal configuration of branch networks is geographic risk diversification. Branches attract deposits and loans from local customers which may have significant idiosyncratic risk. An important implication of a geographically non-diversified banking system is that negative local shocks can have severe consequences and may lead to bank failures (Calomiris, 2000 p.22). By opening branches in multiple local markets with different types of idiosyncratic risk (i.e. uncorrelated risk) a bank can reduce the aggregate risk associated with its branch portfolio. Risk can be spatially correlated and so geographic risk diversification may require banks to have

---

1 There have been different explanations for these restrictions on expansion: from the argument that banks do not internalize the social costs of a bank failure such that, under free entry, there is excess entry relative to the social optimum (Alhadeff, 1962), to political economy interpretations (Economides et al, 1995, and Kroszner and Strahan, 1999).

2 According to the 2007 annual survey of the American Bankers Association (ABA), most consumers still consider traditional branches as their favorite channel to access banking services.
branches in multiple counties, or states, or possibly even multiple countries.

Permitting banks to diversify geographic risk was one of the primary motivations for enacting the Riegle Neal Act. It was believed that removing restrictions on geographic expansion would be beneficial since it would allow banks to decrease the likelihood of failure by diversifying their risk over different geographic locations:

"To the extent that interstate branching restrictions still prevent banks and thrifts from diversifying efficiently, they are obstacles to the efficiency, profitability, safety, and soundness of the financial sector.

Accordingly, the Administration will propose legislation to allow interstate banking and branching."

Economic Report of the President: Year 1991.3

The main purpose of this paper is to study the role of diversification of geographic risk in the branch location decision of retail banks. Our focus is on the period following the passage of the Riegle Neal Act: 1994-2006. In principle, it is possible to argue that, as any other firm that can exit from an industry with limited liability, banks are risk neutral or even risk lovers. However, bank regulators have always attributed a large social cost to bank failures, and they have tried that banks internalize that social cost. In this paper, we seek to determine to what extent banks are influenced by this regulator’s aversion to bank failure such that banks are concerned about geographic risk when they expand their branch networks.

To identify empirically the degree of a bank’s concern on geographic risk, we should take into account other factors that may counter-balance the risk-diversification motive. A first factor is economies of density. The cost of operating a network of branches may depend on the geographic distance between branches. The sources of these economies of density could be technological or informational. Second, sunk entry costs, merging costs, and consumer switching costs make quite costly the expansion and re-configuration of a branch network after deregulation. Some banks may not be large enough to make that type of adjustment profitable. For other banks, the adjustment towards a network that fully exploits the new possibilities of diversification can be slow. According to this explanation, the long-run effects of the Riegle-Neal Act would be significantly larger than the short-run effects. Finally, though risk diversification could be an important motive for bank expansion, it is possible that, in some states, banks were already able to achieve sufficient diversification within a state before the deregulation.

3This quote comes from Chapter 5 of the Annual Report of the Council of Economic Advisors in he Economic Report of the President in 1991. This chapter is a summary of the Treasury’s plan for banking reform entitle Modernizing the Financial System: Recommendations for Safer More Competitive Banks. Similarly, Laurence Meyer, Fed Governor from 1996 to 2002, in a speech at the Ohio Bankers Day Convention, in Columbus, Ohio, given Nov 21 1996 states: "With regard to future banking industry consolidation, the Riegle-Neal Interstate Banking and Branching Efficiency Act of 1994 essentially expands the existing regional compacts to the nation as a whole, and overturns the McFadden Act prohibition on interstate branching. [...] The removal of these artificial barriers to trade is beneficial and will likely improve efficiency and diversification of risks in the banking industry." (http://www.federalreserve.gov/boarddocs/speeches/1996/19961121.htm).
We propose and estimate a model of bank network competition that incorporates the geographic-risk-diversification motive and the other counter-balancing factors mentioned above. The model combines modern portfolio theory with an entry game and oligopoly competition. A key feature of the model is that a bank’s decision of where to operate branches is modeled as a portfolio choice between risky assets, where the risky assets are the many different geographic local markets. Banks are concerned with both the aggregate expected return and the aggregate risk of their “portfolio of local markets”. Although some factors influencing credit and liquidity risk are systematic and therefore common across local markets, others are not. There is an unsystematic/idiosyncratic component to credit and liquidity risk that is specific to the geographic region and the industrial or economic environment. The existence of this unsystematic component makes geographic diversification potentially beneficial. Essentially, diversification allows banks to reach the efficient risk-return frontier determined by the feasible set of geographic markets.

The estimation of the model proceeds in several steps. First, we estimate a model for the expected return (in terms of deposits) of a branch in a local market and for the variance-covariance matrix of local-market risks. Given the large number of local-markets/assets (i.e., 3,101 US counties), we follow the literature in empirical finance, and specify and estimate a very parsimonious factor model for the variance-covariance matrix of local-market risks (Ross, 1976, and Fama and French, 1992, 1993). Given our estimates of the vector of expected returns and of the variance matrix, we construct efficient portfolio frontiers for each state in 1994 (pre Riegle Neal) and in 2007 (post Riegle Neal). These enable us to characterize the reduction in geographic risk made possible by the passage of Riegle Neal, and the extent to which banks engaged in geographic diversification over time.

Next, we estimate the structural game. In our model, a bank’s payoff function depends on four main influences: expected return, risk, reallocation costs, and economies of density. The purpose of the estimation is to learn about the revealed level of risk aversion of the banks, and how this compares to the influence of scale, density, and reallocation costs. Our revealed-preference approach allows us (i) to explicitly determine the degree to which the riskiness of different geographic locations throughout the United States is correlated, (ii) to formally model the way in which geographic diversification allows banks to diversify their deposit portfolio, (iii) to study the extent to which banks actually engaged in risk-reducing expansion following Riegle-Neal, and (iv) to learn about how banks tradeoff risk for return when they select their portfolio of local markets.

To estimate this model, we construct a dataset that combines information from four different sources for the period 1994-2006: branch and deposits data from the FDIC database; information on mergers/acquisitions from the Chicago Fed; a detailed and comprehensive description of the timing of adoption of the Riegle-Neal Act and other restrictions on geographic expansion in different states; and Census Bureau county-level data on population, income and industry composition. We take
advantage of the fact that different states opted into Riegle-Neal at different points in time, and that the extent to which they opted in and removed various restrictions on interstate mergers and de novo entry varies considerably across states and over time.\textsuperscript{4}

Our main empirical findings are the following. We find that for some states, the Riegle Neal act implied a very significant upward shift in the efficient portfolio frontier, while for others the shift was very small.

The approach in this paper stands in contrast to the existing papers that study the relationship between geographic diversification and risk. These papers use much less formal measures of geographic diversification, and focus on the effect of these on measures of risk that are not limited to the risk that can be influenced by geographic diversification. The typical study in this literature involves regressing some measure of risk on some measure of geographic diversification, or analyzing mergers of banks or bank holding companies with different geographic networks. Geographic diversification is usually measured either as (i) a binary variable indicating whether or not a bank is geographically diversified (see for example Demsetz and Strahan 1997, Dick 2006, Akhigbe and Whyte 2003, Schmid and Walter), (ii) the number of banks (in the case of bank holding companies) or branches (see for example Fraser et al. 1997, Hughes et al. 1999), or (iii) a dispersion index (for example distance adjusted, activity-weighted deposit dispersion index (Deng and Elyasiani, 2008), or the inverse of the sum of squares of the percentage of a bank’s deposits in each market where it operates (Liang and Rhoades (1996)).\textsuperscript{5} In the case of mergers, diversification is measured by how much overlap there is between the target and the acquirer’s networks (Emmons, Gilbert and Yeager 2002; Brewer, Jackson, and Jagtiani 2000). Risk is measured using some balance sheet or capital market measure such as the standard deviation of net income to assets (Liang and Rhoades 1999) or the standard deviation of monthly stock returns (Deng and Elyasiani, 2008). The problem with using these measures of risk, as pointed out in many of these papers (see for instance Hughes et al. 1996, Carlson 2004) is that the level of risk is endogenously determined: the ability to diversify

\textsuperscript{4}X states adopted interstate branching prior to the June 1st 1997 deadline. Two more, Texas and Montana, opted out. So on June 1st 1997, Riegle-Neal came into effect in Y states. Texas and Montana subsequently adopted interstate branching (Texas in ** and Montana in **). Immediately upon adoption of Riegle-Neal, interstate branching by merger/acquisition becomes permitted. Interstate branching via de novo establishment must be opted into specifically. As of 1997, thirteen states allowed de novo, and by 2005 twenty-two allowed de novo. These are not the only sources of variation in the level of branching regulation in different states. When allowing de novo, states could specify reciprocity conditions requiring that the laws of the home state of out-of-state banks wishing to establish branches permit de novo as well. In 1997 eight of the thirteen states allowing de novo insisted upon reciprocity, and in 2005 sixteen of the twenty-two did. States opting into interstate branching by merger and acquisition prior to 1997 also tended to specify that the laws of the home state of the out-of-state bank should be similar to those in the target state. States also had leeway in determining three other conditions that limited the ease with which mergers and acquisitions could take place. States could allow out-of-state banks to enter through the acquisition of individual branches rather than entire banks. In 1997 eighteen states permitted acquisition of individual branches, and ten of these states required reciprocity. By 2005 twenty-seven states allowed individual branch acquisitions, and fourteen demanded reciprocity. *There are also limits on the age of the bank targeted for acquisition. on market share. on age of bank.*

\textsuperscript{5}There are also a small number of papers that compare branch and unit banking. See for instance Carlson (2004) and White (1984).
geographically and spread liquidity or credit risk may encourage banks to take riskier positions in other parts of their business so that the overall effect is that the total risk they face is unchanged or even increases. Our risk measure does not have this problem since it is constructed to represent strictly the risk inherent in the different geographic locations.