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## Capital ratios and bank lending: A matched bank approach



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### ABSTRACT

This paper examines the impact of bank capital ratios on bank lending by comparing differences in loan growth to differences in capital ratios at sets of banks that are matched based on geographic area as well as size and various business characteristics. We argue that such comparisons are most effective at controlling for local loan demand and other environmental factors. For comparison we also control for local factors using MSA fixed effects. We find, based on data from 2001 to 2011, that the relationship between capital ratios and bank lending was significant during and shortly following the recent financial crisis but not at other times. We find that the relationship between capital ratios and loan growth is stronger for banks where loans are contracting than where loans are expanding. We also show that the elasticity of bank lending with respect to capital ratios is higher when capital ratios are relatively low, suggesting that the effect of capital ratio on bank lending is nonlinear. In addition, we present findings on the relationship between bank capital and lending by bank size and loan type.

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## 1. Introduction

The impact of regulatory capital requirements on bank lending has been debated for some time.<sup>1</sup> In the wake of the recent financial crisis, the topic has seen renewed attention as concerns arose that large losses at banks would reduce their capital and restrain their lending and as the regulatory community discussed increases in bank capital (see Greenlaw et al., 2008; Mora and Logan, 2010; Berrospide and Edge, 2010; Rice and Rose, 2010).

A perennial challenge when testing the impact of capital on loan growth is separating supply from demand. For example, changes in the economic environment that affect bank capital also likely affect the demand for loans. Deteriorations in the economic environment can cause losses for banks that decrease bank capital; declines in bank capital might result in the regulatory capital ratios becoming binding, or coming closer to binding than the bank might prefer, and prompt the bank to curtail lending. At the same time, deteriorations in economic activity may also reduce the number of borrowers seeking loans.<sup>2</sup>

Scholars have attempted to deal with the supply versus demand problem in a number of ways. Some have used the cross-country nature of banking to see what the impact of a capital shock to banks in one country has on their lending behavior in other countries, where demand is presumably not affected by the shock (Peek and Rosengren, 2000; Mora and Logan, 2010). Others have looked for natural experiments that have resulted in an exogenous shock to bank capital (Rice and Rose, 2010). Still others have embedded the banking system in a dynamic model in which proxies for demand are included directly (Hancock and Wilcox, 1993; Berrospide and Edge, 2010; Gambacorta and Mistrulli, 2004).

In this paper, we deal with the supply versus demand problem in a new and innovative way. Reasoning that banks in the same location face the same economic environment, we compare each bank to a matched set of neighbors to test whether differences in the capital ratios between the bank and its matched neighbors correspond to differences in loan growth during the following year.<sup>3</sup> As the local environment for these institutions is the same, differences in outcomes ought to be related to differences between the banks. To construct the matched set of neighboring banks, we first use geographic constraints as this factor is vital for ensuring that the paired institutions face the same environment. Subject to the location restriction, we then select neighboring institutions that are of roughly similar size and that have similar portfolios of assets and liabilities.<sup>4</sup> We create a set of neighboring banks for each bank for each year between 2001 and 2011. (We actually create two sets of neighboring banks as we construct a one-to-one (1–1) matched set and a one-to-several (1–N) matched set.)

Our technique has a number of benefits. First, we avoid the concern that any list of observables related to local economic conditions may omit some variables or may not fully capture all the factors that are important for economic conditions and local demand. We argue that using matching, which differences out the local effects, is a more robust way to deal with local economic conditions. Second, our matching approach provides a fairly large number of observations, about 3000 bank groups per year, that allow a number of useful experiments. In addition to testing whether the capital levels

<sup>1</sup> A number of papers have provided theoretical reasons why capital ratios should matter. The general argument is that since banks are relatively opaque, adverse selection problems result in a premium on risky bank liabilities. As bank capital ratios deteriorate, this risk premium becomes larger and banks are less able, and find it considerably more expensive, to issue risky liabilities to fund new assets (Stein 1998; Jayaratne and Morgan 2000; Kishan and Opiela 2000; Van den Heuvel 2002). Van den Heuvel (2005) argues that since the market for bank equity is imperfect, banks might be constrained in their lending activity following a negative shock to capital. Thakor (1996) provides a slightly different reason where he argues that binding capital requirements increase the cost of funds and thus results in more rationing. Van Hoose (2007) provides a useful survey of the theoretical literature.

<sup>2</sup> See Peek and Rosengren (2010) for a detailed discussion of the endogeneity issue.

<sup>3</sup> A variety of research has indicated that banks are quite closely tied to their local economy. Petersen and Rajan (1994) find that the local environment was important for bank lending using data from the late 1980s. Aubuchon and Wheelock (2010) find that, even a decade after the removal of branch banking restrictions, many banks operate in a small number of markets and are vulnerable to local economic distress. Brevoort et al. (2010) look at reports by small businesses regarding the distance to their lender and find that the median distance between the business and the commercial bank they interact with was around four miles in 2003.

<sup>4</sup> As described in greater detail below, our empirical analysis relies exclusively on publicly available data for a sample of commercial banks in the United States.

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