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## Bank size, lending technologies, and small business finance

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## ABSTRACT

Under the current paradigm in small business lending research, large banks tend to specialize in lending to relatively large, informationally transparent firms using “hard” information, while small banks have advantages in lending to smaller, less transparent firms using “soft” information. We go beyond this paradigm to analyze the comparative advantages of large and small banks in specific lending technologies. Our analysis begins with the identification of fixed-asset lending technologies used to make small business loans. Our results suggest that large banks do not have equal advantages in all of these hard lending technologies and these advantages are not all increasing monotonically in firm size, contrary to the predictions of the current paradigm. We also analyze lines of credit without fixed-asset collateral to focus on relationship lending. We confirm that small banks have a comparative advantage in relationship lending, but this appears to be strongest for lending to the largest firms.

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## 1. Introduction

The current research paradigm in small business lending emphasizes the advantages of large banks in lending to large, informationally transparent firms and the advantages of small banks in lending to small, opaque firms. In this paradigm, loan officers at large banks are hypothesized to focus on lending to large, transparent firms using their comparative advantages in lending technologies based primarily on “hard” quantitative information that the loan officers may credibly communicate to others in the bank – such as financial ratios from certified audited financial statements, collateral values, and credit scores. Loan officers at small banks have more flexibility to evaluate credit using techniques based primarily on “soft” qualitative information that is difficult to quantify and communicate by the loan officers – such as personal knowledge about the subjective circumstances of the firm, its owner, and its management.

In this paper, we go beyond the current paradigm to analyze bank size and the use of different lending technologies in small business lending. Our tests allow for the possibility that large

banks have a comparative advantage in lending to small businesses, including the smallest, least transparent firms, using hard-information lending technologies. We allow for the possibility that large banks use techniques such as the leasing of assets and lending based primarily on collateral values to lend to the smallest firms. We also analyze more closely the comparative advantages of small banks in using soft information to lend to small firms. Our results provide new evidence that does not always fit the predictions of the current paradigm.

One of the key motivations for our paper is to understand the role of large banks in small business lending. Large banks appear to have been aggressively pursuing very small business credits using “hard” information-based technologies, at least before the recent financial crisis. Banking giants, such as Bank of America, were loosening their standards on small credits to small businesses by relying on “hard” information such as owners’ personal credit scores (Enrich, 2007). As well, recent research shows that large banks provide large amounts of funding and other services to small firms in other nations (e.g., de la Torre et al., 2010). Our data and data from bank regulatory reports are consistent with the fact that most small business loans are made by large banks. We find in our data that banks with over \$1 billion in assets make about 60% of all small business loans, similar to their share of bank branch offices. Likewise, the June 2006 Call Report shows that over 65% of the dollar value of business loans of \$1 million or less and over 68% of the

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value of such loans of \$100,000 or less were made by banks with over \$1 billion in assets.

Our empirical analysis matches data on US small businesses, the banks that lend to them, the contract characteristics of these loans, and information from several other data sources to test the empirical implications of the current paradigm. The data include information about the loan contract, the borrower, the bank, and the bank–borrower relationship for 1811 small business loans.

Using these data, we analyze the comparative advantages of large and small banks when using different lending technologies to lend to firms of different sizes. First, we empirically identify five fixed-asset lending technologies used by the banks to make small business loans. Second, we analyze the role of relationship lending in lines of credit without fixed-asset collateral. This approach is more comprehensive than prior empirical studies, which usually either identify one or two lending technologies or rely on a single measure of relationship strength using the complete set of loans. Our analysis also allows for differences in the comparative advantages for different bank sizes in lending to firms of varying size. This more general approach to studying small business lending by bank size, lending technologies, and firm size yields some new and interesting findings.

Under the current paradigm, large banks generally have a comparative advantage in using hard-information lending technologies – also known as transactions-based lending. The reasons for this comparative advantage are discussed below. Loan officers at large banks are hypothesized to make lending decisions using lending technologies based primarily on hard information. In most cases, the research tends to lump these hard technologies together, which often originates from an assumption that hard technologies may be represented by a single technology – financial statement lending – which relies primarily on statistics in firms' financial statements. In contrast, we allow for the possibility that large banks may not have equal advantages in all of the individual hard technologies. This implies that financial statement lending may not be representative of hard technologies as a whole.

The assumption about the representativeness of financial statement lending implies that large banks' comparative advantage in using hard-information lending technologies should be monotonically increasing in the size of the firm. As firms increase in size, they tend to have higher-quality financial statements, yielding an implied increasing advantage in hard technologies (see Berger and Udell (2006) for a summary of the current paradigm). However, we permit the comparative advantage of large banks to be increasing, decreasing, or nonmonotonic in firm size. If financial statement lending is not representative of hard-information lending technologies, then large banks may have differing comparative advantages across these technologies when lending to firms of different sizes.

The current paradigm also predicts that small banks tend to have comparative advantages in using soft-information technologies to lend to the smallest firms. Loan officers at small banks are hypothesized to have more flexibility to evaluate credit using techniques based primarily on “soft” qualitative information that is difficult to quantify and communicate by the loan officers – such as personal knowledge about the subjective circumstances of the firm, its owner, and its management. In particular, relationship lending – which is based primarily on information gathered over the course of a bank–borrower relationship, such as the owner's character or reliability – is often analyzed as a soft-information technology. We take a step beyond this analysis by allowing the comparative advantage of small banks in relationship lending to be increasing, decreasing, or nonmonotonic in firm size.

Our main empirical findings are:

- (1) Large banks appear to have different comparative advantages in each of the fixed-asset lending technologies, which

implies that no single hard technology is representative of all of the hard lending technologies;

- (2) The measured comparative advantages of large banks in hard technologies do not all appear to be monotonically increasing in firm size; and
- (3) Small banks appear to have a comparative advantage in relationship lending, but this advantage seems to be strongest for lending to the largest firms.

All of these major results are new to the literature and conflict with the predictions of the current paradigm.

The remainder of the paper is organized as follows. Section 2 reviews the literature and explains our contribution. Section 3 describes the data and our approach to analyzing the lending technologies used by banks to lend to small businesses. Section 4 shows our methodology for testing the implications of the current paradigm, and Section 5 gives the empirical results from those tests. Section 6 concludes.

## 2. The literature and our contribution

The current paradigm for small business lending concentrates mainly on two categories of lending technologies, hard- and soft-information technologies. It is often explicitly or implicitly assumed under the current paradigm that hard technologies as a whole may be represented by the financial statement lending technology alone. Based on this assumption, the conclusion is often drawn that hard technologies are best suited for serving the largest, most transparent small businesses that tend to have the highest quality financial statements. Thus, for most of the research in the current paradigm, as firms increase in size and transparency, banks tend to substitute from the use of a soft technology to one of the hard technologies.

The assumptions employed about the technologies in the current paradigm may result in biased or misleading empirical results. The empirical research in most cases does not separately identify the individual hard-information technologies employed by the lending banks. Instead, researchers often focus solely on the soft technology of relationship lending (e.g., Petersen and Rajan, 1994; Berger and Udell, 1995; Degryse and Cayseele, 2000). This research generally uses a measure of bank–borrower relationship strength, such as relationship length or breadth, as a continuous indicator of the degree to which the relationship lending technology versus a hard technology is effectively applied. This practice effectively groups the hard-information technologies together, so any measured effect of these technologies at best reflects an overall average effect across the individual lending methods, and may not accurately measure the effects of financial statement lending or any other single hard technology.

Moreover, the measured effect of hard technologies may be biased from the inadvertent inclusion of the effects of soft technologies other than relationship lending. That is, the measured effect of hard technologies may also mix in the effects of soft technologies that are associated with weak banking relationships. We postulate a soft-information technology that we call “judgment lending,” which is lending based primarily on the judgment of a loan officer relying on experience and training, as well as any other available hard and soft information. While judgment of the loan officer is important for virtually any lending technology, it may be the principal information source for lending to some firms, such as small businesses that do not have significant hard information available and have not established a strong banking relationship. The exclusion of soft technologies such as judgment lending suggests that measured effects of relationship lending may not accurately reflect the effects of soft

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