Staff Studies

Federal Deposit Insurance Corporation Staff Studies

Report No. 2020-04
Measurement of Small Business
Lending Using Call Reports:
Further Insights From the
Small Business Lending Survey

July 2020

FDIC

Measurement of Small Business Lending Using Call Reports: Further Insights From the Small Business Lending Survey

Jacob Goldston and Yan Y. Lee[1]

Abstract: Aggregate U.S. bank lending to small businesses is often approximated with regulatory data based on loan size using commercial and industrial (C&I) loans of $1 million or less as a proxy. We assess the validity of this proxy in measuring small business lending using data from the Federal Deposit Insurance Corporation's (FDIC's) Small Business Lending Survey (SBLS), a nationally representative survey of banks. We find that more than 30 percent of C&I lending by banks with $1 billion to $10 billion in assets is in small loans (less than $1 million) to large firms or larger loans to small firms, which contradicts the core assumption of high correlation between loan size and firm size that underpins usage of the proxy. When we relax the proxy's assumption for loan size using parameters generated from the survey data, we find that aggregate small business lending by banks likely recovered from the 2007–2009 recession (Great Recession) two to four years earlier than indicated by the proxy. Using $10 million in gross annual revenue as a maximum small business size, we find that the proxy on net understates small business lending by banks with $1 billion to $10 billion in assets by up to 23 percentage points, with wide dispersion among banks in the degree of over- and understatement. This dispersion undermines the proxy's ability to correctly rank banks by the proportion of their C&I loan portfolio devoted to small business lending. We also find that the proxy likely only mildly understates small business lending for the smallest banks, those with less than $1 billion in assets.

---

[1] Economists, Federal Deposit Insurance Corporation.

1 Introduction

Small businesses are important to the U.S. economy, and banks are important to small businesses. In 2015, there were 30.2 million small businesses in the United States.[2] These firms make up 99.9 percent of all U.S. businesses and generate 47.5 percent of private sector employment and 40.8 percent of private sector payroll. Small businesses typically cite bank credit as their most common source of external financing.[3] Bank lending to small businesses is monitored through Consolidated Reports of Condition and Income (Call Reports).[4] Since 1993, C&I loans of $1 million or less have been used as a proxy for small business lending. While the proxy reliably measures small loans to businesses, it does not directly measure loans to businesses that are small.[5]

Using proxy data, the standard narrative of small business lending since the Great Recession is one of a slow recovery. In a report to the Small Business Administration (SBA), Cole (2018) states that bank lending to small businesses "plummeted by almost 20 percent during 2009–2011" and that "bank lending to small businesses continued to decline during the post-crisis years of 2012–2015." Reichow (2017) describes small business lending as "languishing" and notes that "small-business loans at U.S. commercial banks have declined 15 percent from their precrisis high." Cortes et al (2020) motivate their research on the effect of stress testing by noting that "lending to large businesses has bounced back since the Great Recession … [t]he recovery of small business lending, however, continues to be slow." Bordo and Duca (2018) situate their work on the impact of the Dodd-Frank Act in a similar way.

These conclusions assume that the proxy is an accurate measure of small business lending. The basic assumptions required to use the proxy as a measure of small business lending are that small loans (less than $1 million) tend to be made to small businesses and larger loans to large businesses. But had the proxy threshold of $1 million been adjusted for inflation, it would have been more than $1.6 million by December 2015.[6] This suggests that loans greater than the $1 million threshold may be extended to small businesses and that the proxy understates small business lending. Conversely, some small loans may be extended to large businesses, which would result in an overstatement of small business lending when relying on the proxy. The goal of this study is to determine whether the underlying assumptions of the proxy hold and to investigate the implications if these assumptions are violated.

Given the proxy's potential to misstate small business lending, the Government Accountability Office (GAO) recommended in 2018 that the three federal banking regulatory agencies— the FDIC, the Board of Governors of the Federal Reserve System, and the Office of the Comptroller of the Currency—"reevaluate, and modify as needed, the requirements for the data banks report in the Consolidated Reports of Condition and Income to better reflect lending to small businesses."[7] In October 2019, the agencies published a joint Federal Register notice requesting public comment on ways to modify data collection to "better reflect lending to these sectors of the U.S. economy."[8] The implementation of any changes to Call Report collection is of particular interest to the FDIC given its role as steward of Call Report data.[9]

---

[2] "Frequently Asked Questions About Small Business," U.S. Small Business Administration Office of Advocacy, U.S. Small Business Administration, August 2018, https://www.sba.gov/sites/default/files/advocacy/Frequently-Asked-Questions-Small-Business-2018.pdf.

[3] Federal Reserve Small Business Credit Survey, Report on Employer Firms, 2017.

[4] While bank-level outstanding loan volumes are collected under Call Reports, banks also annually provide data under the Community Reinvestment Act on the geographic location of their new C&I loan originations of $1 million or less.

[5] In addition, loans collateralized by residential real estate are not captured by the proxy.

[6] Adjustment using the Bureau of Labor Statistics' Consumer Price Index for All Urban Consumers (CPI-U).

[7] "Community Banks: Effect of Regulations on Small Business Lending and Institutions Appears Modest, but Lending Data Could Be Improved," U.S. Government Accountability Office, September 5, 2018, https://www.gao.gov/reports/GAO-18-312/.

[8] See 84 Fed. Reg. 55687 (October 17, 2019).

[9] Section 122 of the FDIC Improvement Act of 1991 provides that "the appropriate Federal banking agency shall prescribe regulations requiring insured depository institutions to annually submit information on small businesses and small farm lending in their reports of condition." In addition, Section 7(a) of the Federal Deposit Insurance Act provides that Call Reports for state nonmember banks be in the form and contain information that the FDIC Board of Directors requires.

In this study, we use data from the FDIC's Small Business Lending Survey (SBLS) to evaluate the usefulness of the proxy in measuring small business lending. The SBLS is a nationally representative survey of U.S. banks' small business lending activities and practices. Critical to our study, a subset of the survey questions asked banks with greater than $1 billion in assets to break down their outstanding C&I loan balances by both loan size and borrower firm size, providing more detail than Call Reports. We use these responses, along with other quantitative and qualitative survey questions, to evaluate the accuracy and precision of the proxy. Because the SBLS is nationally representative and has a high response rate, it can be used to make statistical inferences about the entire population of U.S. banks.

Questions regarding banks' calendar year 2015 activities were asked during data collection in 2016 and 2017, and a report of main findings was published in 2018.[10] The survey was conducted and implemented by the U.S. Census Bureau (Census) to ensure the confidentiality of data collected from respondent banks. From a universe of 6,018 institutions, 1,961 banks were sampled[11] and asked to complete the survey and 1,174 ultimately responded, yielding an overall response rate of 59.9 percent.[12]

The number of large banks (those with assets of greater than $10 billion) that responded to the quantitative questions about loan and firm size fell below the reporting threshold for protecting respondents' identities, which limits the scope of this study.[13] Therefore, the main analysis and conclusions primarily use data from banks with $1 billion to less than $10 billion ("$1 billion to $10 billion") in assets. While no separate analysis is conducted for large banks, responses for these banks are incorporated if the additional data improve the precision of estimates. We also analyze the accuracy of the proxy for the smallest banks, those with less than $1 billion in assets, using a qualitative survey question on whether banks focus their C&I lending activity on small businesses.

Using the survey data combined with some reasonable assumptions, we find that the proxy mildly understates small business lending by the smallest banks. However, for banks with $1 billion to $10 billion in assets, the proxy's underlying assumption—that small loans are much more likely than large loans to go to small businesses—is contradicted by banks' actual lending practices. Comparisons between Call Report data and the survey data show that loan size and firm size are only weakly correlated, which causes the proxy to be both generally inaccurate at the industry level and imprecise at the bank level. At the industry level, more than 30 percent of the C&I lending by banks with $1 billion to $10 billion in assets is in small loans to large businesses or large loans to small businesses when using either of the two small business size thresholds available in the survey data. On net, the proxy likely understates industry-level small business lending for banks with assets of $1 billion to $10 billion by up to 23 percentage points. Further, at the bank level, we find wide dispersion across banks in how much the proxy over- or understates small business lending.

---

[10] See FDIC (2018) for more detail on the SBLS.

[11] The SBLS sample included banks of all sizes and in both urban and rural areas. Drawing from institutions regulated by all three banking agencies yielded a universe of 6,018 banks that were FDIC-insured, had filed both a Q4 2015 Call Report and annual Summary of Deposits branch-level geographic data, had at least one branch in a U.S. state or in the District of Columbia, had positive outstanding loan activity, received core deposits, and were of an entity type likely to conduct nonzero commercial lending activity. The few institutions that were dropped include bridge banks, industrial banks, investment banks, joint stock companies, life insurance companies, and pension funds. Within the universe, banks with assets of less than $10 billion were stratified along two dimensions into six strata: (1) total asset size (less than $250 million, $250 million to less than $1 billion, and $1 billion to less than $10 billion); and (2) whether the majority of the institution's deposits were in branches located within a metropolitan statistical area (MSA). Banks with assets greater than $10 billion were stratified, by asset size only, into two additional strata: $10 billion to less than $50 billion, and $50 billion or more. Overall, eight strata were created. See Appendix A of FDIC (2018).

[12] Overall survey response rates were 60.0 percent for small banks (those with assets of less than $10 billion) and 57.8 percent for large banks (those with assets of $10 billion or greater). Across the eight strata, response rates ranged from 56.3 percent (banks with $50 billion or more in assets) to 63.9 percent (banks in primarily non-MSA areas with assets of $1 billion to less than $10 billion). See Appendix A of FDIC (2018).

[13] The lack of usable data from large banks is unsurprising. Relatively few (90) large banks were in our universe at the time of the survey. Those that decided to participate needed to have data systems required to answer the questions and to answer each question. While for non-quantitative questions (31 distinct questions relevant to large banks) the average question-by-question response rates was 93.0 percent for banks with $10 billion to less than $50 billion in assets and 94.4 percent for banks with $50 billion or more in assets, large banks exhibited the largest drop-off in average response rates for quantitative outstanding loan balance questions (16 distinct items). See Appendix A of FDIC (2018).

These discrepancies are not inconsequential. Adjusting proxy shares to allow for even a small proportion of large loans to be made to small businesses significantly alters our understanding of the evolution of small business lending since the Great Recession. Using survey-generated metrics of banks' actual lending activity shows that small business lending after the recession likely recovered two to four years earlier than the proxy indicates. And given the wide variation in the degree to which the proxy over- or understates bank-level small business lending, the ability of the proxy to correctly identify whether one bank has a higher share of its commercial loan portfolio in lending to small businesses is limited.

The study is organized as follows: Section 2 discusses how the proxy measure came about and how SBLS data can be used to assess its potential limitations. Section 3 contains our main analysis of the accuracy and precision of the proxy, primarily for banks with $1 billion to $10 billion in assets. We exploit a disaggregation of banks' C&I lending by firm gross annual revenue (GAR) not collected by Call Reports but available in the survey data. Section 4 presents a separate analysis of the overall accuracy of the proxy for measuring small business lending for only the smallest banks, those with assets of less than $1 billion. Section 5 concludes.

2 The Proxy and Difficulties in Measuring Small Business Lending

Understanding bank lending to small businesses is critical given the importance of small businesses to the U.S. real economy and the importance of banks to small businesses. Unlike large businesses, small businesses generally do not have access to capital markets and, therefore, typically rely on banks for most of their external financing.[14] Also, it is believed that smaller banks are more suited to meet the credit needs of smaller businesses, often considered opaque given their lack of audited financial statements.[15] Therefore, Congress mandated that small businesses' dependence on banks be monitored, which regulators implemented through the collection of proxy data via Call Reports.[16] To determine whether the proxy is a useful measure of small business lending, we first discuss how the current proxy came about, introduce the SBLS survey questions that can be used to investigate the proxy's potential limitations, and evaluate whether survey data on firm size reflect banks' actual lending to small businesses.

2.1 A History of the Proxy for Small Business Lending

U.S. banks must file Call Reports at the end of each quarter. Section 122 of the FDIC Improvement Act of 1991 required the banking regulatory agencies to annually collect data on bank lending to small businesses.[17] This requirement was implemented in 1993 by the new Schedule RC-C, Part II of the Call Report.[18] Banks must provide "outstanding loan balances with original amounts of $1 million or less for commercial and industrial purposes, excluding loans secured by real estate and loans for the purpose of financial agricultural production." Banks provide the total number and total amount outstanding for these loans, stratified into three buckets based on loan amount at the time of origination: less than $100,000, $100,000 to

---

[14] For example, the Kauffman Firm Survey, an annual longitudinal study that has followed almost 5,000 new firms since 2004, finds that outside debt, such as credit cards, credit lines, and bank loans, was the most important source of financing for new firms, followed by owner equity (Robb and Robinson, 2010). Combined, these two sources account for about 75 percent of startup capital.

[15] See Udell (2008) for a discussion of nonfinancial statement-based relationship lending technologies. Small banks are believed to be able to more cost effectively process non-quantifiable soft information, perhaps given their closer physical proximity to borrowers or flatter organizational structures, to make viable loan decisions for borrowers that may have difficulty receiving financing elsewhere. See, for example Berger et al. (2005) and Berger and Udell (2002).

[16] See 84 Fed. Reg. 55688-9 (October 17, 2019) for more background on how the Federal Reserve Board uses these data to monitor credit conditions and assess real economic activity.

[17] Banks must collect data on small farm lending as well; see 12 U.S.C. § 1817.

[18] See 57 Fed. Reg. 54633 (November 19, 1992). The schedule was to be completed as of June 30 of each year. After the Great Recession, to collect better trend data, the agencies increased the reporting frequency to quarterly beginning with the first quarter 2010 Call Report; see 74 Fed. Reg. 68322 (December 23, 2009). In 2017, the agencies again adjusted the frequency of the collection for institutions with less than $5 billion in assets, from quarterly to semiannually, to reduce reporting burden. Banks with assets of less than $5 billion submit the "Consolidated Reports of Condition and Income for a Bank with Domestic Offices Only and Total Assets Less than $5 Billion," or FFIEC 051. The two other versions of the Call Reports are the "Consolidated Reports of Condition and Income for a Bank with Domestic and Foreign Offices," or FFIEC 031, and the "Consolidated Reports of Condition and Income for a Bank with Domestic Offices Only," or FFIEC 041. See 82 Fed. Reg. 2444 (January 9, 2017).

$250,000, and $250,000 to $1 million. Throughout this study, we will refer to the dollar volume of this collection as the proxy for small business lending.[19]

The proxy came about because of perceived difficulties banks had in providing data by business size. In 1992, the Federal Financial Institutions Examination Council (FFIEC) requested comment on proposed reporting requirements that based the collection of small business loan data on a business's annual sales; the FFIEC proposed that the "appropriate upper limit in defining the size of a small business" be $10 million in annual sales.[20] These loans were to be separately reported for three size categories of small businesses: those with less than $250,000 in annual sales, those with $250,000 to $1 million in annual sales, and those with $1 million to $10 million in annual sales. Consistent with existing reporting requirements, the FFIEC proposed that banks report the number and amount outstanding of C&I loans or loans secured by nonfarm nonresidential properties.

The industry response to the proposal was negative: 436 of the 537 comments received from banks, thrifts, and their trade associations opposed the proposed reporting requirements. Depository institutions indicated that while annual sales may be included in a borrower's credit file, sales data "are not usually contained in either automated or manual loan systems."[21] Bank loan systems would therefore have to be modified to meet the proposed requirement. Some commenters suggested using a measure based instead on loan size, which was already available in their loan systems and which they believed would be indicative of borrower size.

In response to the public comments, the FFIEC adopted a loan-size approach to measure small business lending, since this approach would "allow institutions to report information of comparable value at a lower cost to the industry."[22] The FFIEC also said the 1989 National Survey of Small Business Finance confirmed a "strong correlation between size of business and loan size."

The FFIEC deemed a loan-size cutoff of $1 million as "reasonable." At the time, there were more than 9,500 depository institutions with less than $100 million in assets; $1 million was about the maximum amount these banks could lend to a single borrower given the combination of legal lending constraints and bank equity capital positions.[23] Further, $1 million was the amount suggested by commenters who had advocated using a measure based on loan size. Therefore, federal bank regulators adopted and still use outstanding balances for loans of up to $1 million at the time of origination as a proxy for small business lending.[24]

The SBLS allows us to explore banks' use of technology to determine if institutions today are better equipped to report loans by firm size and if bank size affects an institution's ability to report that data. Banks were asked whether their core data systems could collect information related to loan volume by firm size. The findings show that banks still do not use data systems that collect and can report lending by firm sales volume. The ability to provide outstanding loan balances—data reported in the Call Report—by firm gross annual revenue is lowest for the smallest banks and increases with bank size (Figure 1). Only 12.3 percent of banks with less than $250 million in assets can report loans for firms with GAR of $1 million or less and only one-tenth can do so by any firm size. Even among large banks, only 47.9 percent can report loans for firms

[19] In addition to small commercial and industrial loans, banks report small agricultural loans and small loans secured by nonfarm nonresidential properties. In some instances, such as 84 Fed. Reg. 55688 (October 17, 2019), the definition of "loans to small businesses" includes these other categories as well. Throughout the paper, we refer solely to small commercial and industrial loans for consistency between Call Report data and SBLS data.

[20] See 57 Fed. Reg. 21409–21414 (May 20, 1992) for the originally proposed reporting requirements presented for public comment. Comment was also requested on whether reporting institutions should be allowed to use a three-year average for annual sales and whether the size category of the small business be fixed to the time of the credit decision.

[21] See 57 Fed. Reg. 54235–54239 (November 17, 1992) for the FFIEC's summary of public comments received and the final approved reporting requirements.

[22] See 57 Fed. Reg. 54237 (November 17, 1992).

[23] Legal lending limits typically allow banks to make loans to one borrower up to 15 percent of equity capital (more if secured by readily marketable collateral). Therefore, a $100 million bank with a 10 percent equity capital ratio could lend up to $1.5 million to one borrower. At the end of second quarter 1992, the ratio of equity capital to total assets for commercial banks with $100 million in assets was 9.4 percent, implying that the smaller amount of $1 million was reasonable for these institutions. See 57 Fed. Reg. 54238 (November 17, 1992) for more discussion on the FFIEC's reasoning.

[24] The $1 million loan-size cutoff is likely outdated, however. By fourth quarter 2015, the average legal lending limit for the almost 6,000 banks with less than $10 billion in assets was $8.9 million. Calculations were made using Call Report data and reference only the portion of the limit for unsecured lending.

with a GAR of $1 million or less and 27.0 percent can report loans by any firm size. Within each bank size group, banks are only slightly more likely to be able to provide data by firm GAR for new loan originations relative to outstanding loan balances.[25]

These findings suggest that the vast majority of banks likely would face transition costs if they had to collect data on bank loans to small businesses based on business size. But using loan size as a proxy for small business lending also has a cost in terms of the current proxy's potential to inaccurately and imprecisely measure small business lending.

Figure 1

My Bank's Core Data Systems Have the Ability to Retrieve the Number and Dollar Volume of...

(Percent Bank-Weighted)

As of Call Report Date December 31, 2015

...outstanding loan balances, made to firms with $1 million or less in gross annual revenue? (Screener 6)
- Less Than $250M: 12.3
- $250M to Less Than $1B: 30.4
- $1B to Less Than $10B: 40.9
- $10B+: 47.9

...outstanding loan balances, by firm gross annual revenue, for any sized firm? (Screener 7)
- Less Than $250M: 10
- $250M to Less Than $1B: 19.7
- $1B to Less Than $10B: 22.5
- $10B+: 27

For Calendar Year 2015

...new loan originations and renewals, made to firms with $1 million or less in gross annual revenue? (Screener 2)
- Less Than $250M: 14.4
- $250M to Less Than $1B: 33.2
- $1B to Less Than $10B: 46.5
- $10B+: 53.7

...new loan originations and renewals, by firm gross annual revenue, for any sized firm? (Screener 3)
- Less Than $250M: 12.7
- $250M to Less Than $1B: 20.4
- $1B to Less Than $10B: 28.5
- $10B+: 32.8

■ Less Than $250M   ■ $250M to Less Than $1B   ■ $1B to Less Than $10B   ■ $10B+

Source: Small Business Lending Survey (SBLS) Screener Questions S2, S3, S6, and S7.
Note: See Appendix C of the 2018 SBLS report for the survey instrument. For each screener question, differences across bank size groups are generally statistically significant at the 10 percent significance level, with most differences significant at the 1 percent significance level. Within each bank size group, differences between outstanding loan balances and new originations for the same firm size are generally statistically significant at the 10 percent level. SBLS responses are bank-weighted to represent the proportion of banks in the U.S. banking industry that exhibit these characteristics.

2.2 Business Size Versus Loan Size

Because the proxy is based entirely on loan size, there are two ways in which it could deviate from true small business lending. First, banks may make small loans to large businesses; these loans would be included in the proxy but are not small business lending. Second, banks may make large loans to small businesses; these loans would be excluded from the proxy even though they are small business lending. Figure 2 depicts the lending to small businesses that regulators hope to capture (left column) compared with the actual lending captured by proxy available in Call Reports (top row). Small businesses are those firms below a particular size threshold (typically gross annual revenue, in the context of bank lending) or based on certain criteria. These firms receive loans of varying sizes, some above and some below the $1 million proxy threshold. The proportion of total business lending by a bank (or by the banking industry) that is true "small business lending" is represented

---

[25] Within each small bank size group, the differences in banks' ability to provide data by firm size between outstanding loan balances and new originations are typically statistically significant at no less than the 10 percent significance level; the differences within the large bank group are marginally significant. Banks may be better able to provide originations data by whether the firm has gross annual revenue of $1 million or less because of Community Reinvestment Act (CRA) requirements for banks of above about $1 billion in assets (asset thresholds for reporting are CPI-adjusted yearly). To verify whether banks lend back into the communities from which deposits are received, these banks are asked for the geographic distribution of new C&I origination dollars for loans of $1 million or less. While banks are not required to provide these data by firm GAR, they are asked to provide the volume of the subset that is to firms with GAR of less than $1 million, if they already collect these data of their own accord. See the FFIEC's "A Guide to CRA Data Collection and Reporting."

by Cell A and Cell B, which together equal the share composed of loans of any size extended to a small business. By contrast, the proxy measures small loans to businesses; this proportion is represented by the sum of Cell A and Cell C. Therefore, Cell B is the gross understatement of small business lending when using the proxy (large loans extended to small businesses), and Cell C is the gross overstatement (small loans extended to large businesses).

Figure 2

Small Business Lending Versus Call Report Proxy Lending

Source: Authors' illustration.
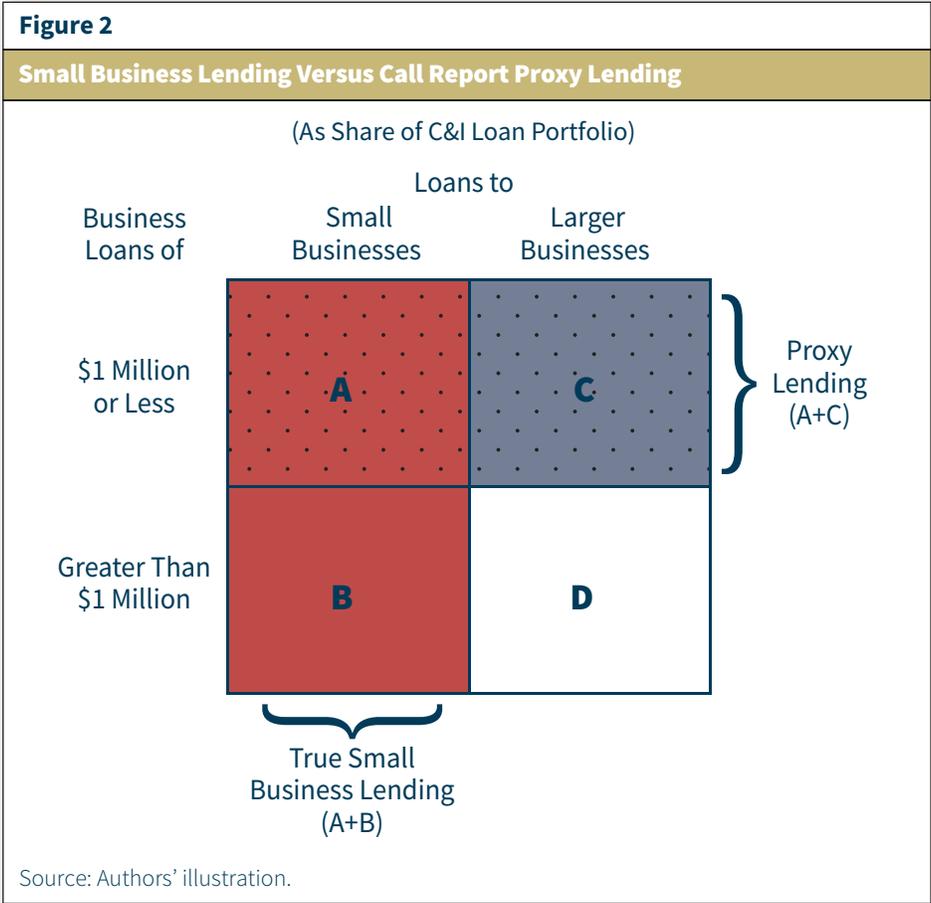
To assess the proxy's accuracy in capturing lending to small businesses, we need to know the sizes of businesses receiving the loans. In this study, we use an SBLS survey question that asked banks with $1 billion or more in assets to allocate their year-end 2015 Call Report C&I outstanding loan dollars both for loans less than $1 million at the time of origination (the proxy) and the remainder that was above $1 million, by three firm gross annual revenue buckets:

1. $1 million or less,

2. Greater than $1 million to less than $10 million, and

3. $10 million or more.

Therefore, two possible small business thresholds are available from the survey data: GAR of $1 million or less and GAR of less than $10 million. FDIC (2018) assumes that all firms with GAR of $1 million or less are small businesses to show that a nonzero share of loans not captured by the proxy were extended to those businesses—that the share represented by Cell B from Figure 2 is greater than zero. In dollar terms, at banks with assets of $1 billion to $10 billion, FDIC (2018) found at least $19.1 billion in gross understatement of small business lending (in which small businesses with less than $1 million in gross annual revenue received loans with amounts greater than $1 million).[26]

_____

[26] Values in 2015 dollars. The estimates in FDIC (2018) differ somewhat from those in this study because of differences in how banks that gave partial answers to certain SBLS questions were treated.

However, gross overstatement may also exist in the proxy, represented by Cell C in Figure 2. While FDIC (2018) addresses only gross understatement based on the $1 million GAR threshold, here we investigate overall *net* misstatement by considering both gross overstatement and gross understatement in the proxy. To further our understanding of the potential limitations of the proxy as a measure of small business lending, we use both small business size thresholds available from the SBLS data ($1 million GAR and $10 million GAR) to generate our estimates.

2.3 What Size Is a Small Business, and Does It Matter for Banks?

One of the fundamental difficulties in measuring small business lending is that there is no single, consistent definition of a "small business" or even a single agreed-upon metric.[27] Reporting requirements under the Community Reinvestment Act (CRA) suggest a GAR threshold of $1 million, while the SBA uses industry-based size standards based partially on GAR and partially on other metrics. Also, less than one-half of banks define small business borrowers internally using gross annual revenue. Here, we describe some of the GAR sizes commonly used for regulatory purposes to define small businesses and present survey results from the SBLS to show the size thresholds most often used by banks—if they use such a threshold. Even accepting GAR as the proper metric, we show that a threshold of $1 million misses a substantial quantity of self-defined small business lending by banks. Therefore, in the main analysis of this study we use both the $1 million and $10 million GAR thresholds.

2.3.1 No Consistent Definition for Small Businesses, Even for Regulators

Federal regulators use many size thresholds to define a small business. The FFIEC initially suggested in 1992 that firms with annual sales of less than $10 million per year be considered small businesses for the purposes of bank lending. In the CRA collection, if a bank already collects firm gross annual revenue data, it is then asked to report the volume of loans made to firms with GAR of $1 million or less—the idea being that data by firm size would "enable…the public to judge whether the institution is lending to small businesses…or whether it is only making small loans to larger businesses."[28] However, in findings and recommendations provided to the FDIC gleaned from bank field testing interviews conducted to develop the SBLS, the Census noted that "many respondents…disagree with the most-known definition of small business, $1,000,000 in annual revenue" and that usage of this threshold "seems to be increasingly rare."[29]

Consistent with this sentiment, the SBA uses business size thresholds typically several magnitudes greater than $1 million firm GAR to conduct their small business guarantee programs.[30] The SBA uses 31 industry-based size standards, 16 of which are receipts-based thresholds.[31] Of those 16 thresholds, only one is set at $1 million; all others are set at $6 million or above and range up to $41.5 million. For example, $7.5 million is the size standard for the services, retail trade, and construction industries. Since 2009, the SBA also allows an alternative non-industry–based size standard for its 7(a) and 504/Certified Development Company (CDC) programs: no more than $15 million in tangible net worth and no more than $5 million in average net income after taxes.

---

[27] There are many different ways to characterize a small business besides business size. More than one-half of banks with less than $10 billion in assets (47.9 percent) and a majority of banks with more than $10 billion in assets (78.9 percent) use revenue or sales to characterize their small business borrowers. Banks with less than $10 billion in assets also often cite aspects such as ownership structure, number of employees, footprint in the local community, and owner involvement in the day-to-day operations of the business. See Section II and SBLS Question 1 in Appendix C of FDIC (2018).

[28] See page 13 of the FFIEC's "A Guide to CRA Data Collection and Reporting." In practice, the CRA data collected by firm size are not informative for many banks. No separate indicator exists for whether a bank *cannot* provide data by firm size; therefore, relying on the indicator for loans to businesses with $1 million GAR or less would make banks that cannot report by firm GAR appear from their CRA data to have extended no loans to those businesses.
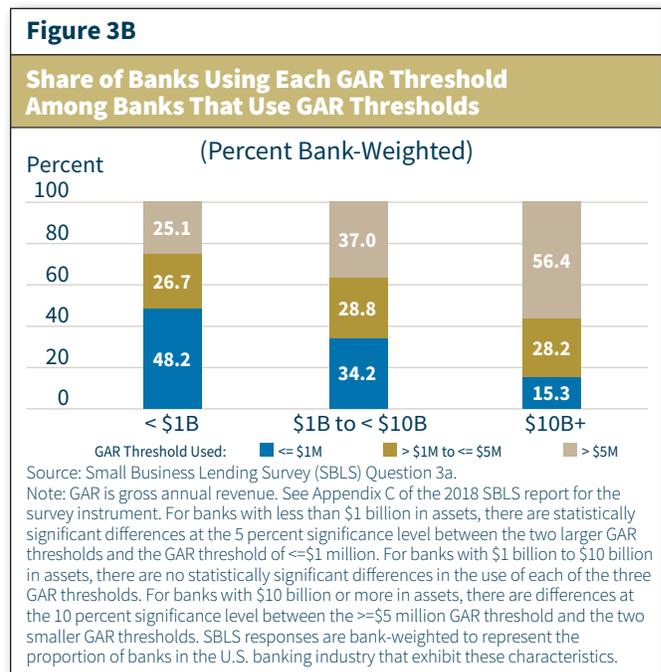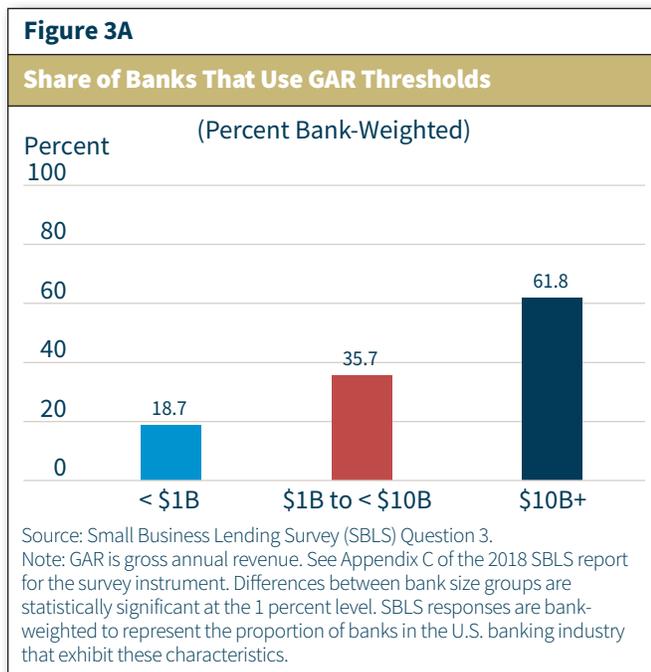
[29] Field testing of the SBLS survey instrument was conducted throughout 2015 over three rounds with 40 banks of all size groups, in both rural and urban areas of ten states. The testing showed that community banks typically did not use size criteria to classify commercial loans as small business loans, but rather considered that "most business loans were for small businesses because of the size of the banks" themselves. See Appendix A of FDIC (2018).

[30] The SBA guarantees loans made through banks, credit unions, and other lenders to U.S. small businesses that would have difficulty obtaining credit without its assistance. See 13 U.S.C. § 121.

[31] There are also nine employee-based size standards, one asset-based standard, and one size standard based on the combination of number of employees and "barrel per day refining capacity." See Dilger (2019).

2.3.2 Small Business Sizes Used by Banks

The actual business size thresholds used by banks may differ from those used by government entities. The SBLS allows us to determine whether banks formally use firm gross annual revenue thresholds to conduct their small business lending, and if they do, what those specific thresholds are.[32] Figure 3A shows that larger banks are more likely to formally use a GAR threshold to define small businesses. Less than one-fifth (18.7 percent) of the smallest banks use such a threshold compared with more than one-third (35.7 percent) of banks with $1 billion to $10 billion in assets.[33] Further, while a majority of large banks (61.8 percent) use a GAR threshold, about two-fifths do not. For the banks that use a formal GAR threshold, the majority of banks of all sizes use a threshold *above* $1 million in firm gross annual revenue (Figure 3B). Larger banks typically use higher thresholds. For banks with less than $1 billion in assets, 25.1 percent of those that use such a threshold use one greater than $5 million in firm GAR, while 37.0 percent of banks with $1 billion to $10 billion in assets that use a threshold use one of that size.

Figure 3A
Share of Banks That Use GAR Thresholds

Source: Small Business Lending Survey (SBLS) Question 3.
Note: GAR is gross annual revenue. See Appendix C of the 2018 SBLS report for the survey instrument. Differences between bank size groups are statistically significant at the 1 percent level. SBLS responses are bank-weighted to represent the proportion of banks in the U.S. banking industry that exhibit these characteristics.

Figure 3B
Share of Banks Using Each GAR Threshold Among Banks That Use GAR Thresholds

Source: Small Business Lending Survey (SBLS) Question 3a.
Note: GAR is gross annual revenue. See Appendix C of the 2018 SBLS report for the survey instrument. For banks with less than $1 billion in assets, there are statistically significant differences at the 5 percent significance level between the two larger GAR thresholds and the GAR threshold of <=$1 million. For banks with $1 billion to $10 billion in assets, there are no statistically significant differences in the use of each of the three GAR thresholds. For banks with $10 billion or more in assets, there are differences at the 10 percent significance level between the >=$5 million GAR threshold and the two smaller GAR thresholds. SBLS responses are bank-weighted to represent the proportion of banks in the U.S. banking industry that exhibit these characteristics.

2.3.3 Does Small Business Lending Occur Above the $1 Million GAR Threshold?

Using a formal size threshold to identify whether a business is small does not necessarily imply that lending is actually extended to businesses of that size. We use survey data to confirm that banks extend loans of any size to businesses that they consider small but are larger than the $1 million GAR threshold. The SBLS asked banks about their new origination volumes in relation to internal bank thresholds. Banks with $1 billion or more in assets were asked for the dollar volume of their C&I loans to businesses with gross annual revenue of $1 million or less, regardless of the internal threshold, and C&I loans to businesses with gross annual revenue of less than the bank's internal GAR threshold (if the bank had indicated in an earlier question that a formal threshold was used).[34]

---

[32] See SBLS Question 3 and SBLS Question 3A in Appendix C of FDIC (2018).

[33] FDIC (2018) shows that only 20.4 percent of banks with less than $10 billion in assets use firm gross annual revenue thresholds to define small businesses.

[34] See SBLS Question 8 in Appendix C of FDIC (2018). The definition of C&I lending differs from the Call Report definition in that it includes all loans for C&I purposes, regardless of how the loans were secured. Banks were also asked the volume of these C&I new originations primarily secured by 1–4 family residential properties. FDIC (2018) documents that at least $18 billion in outstanding small business C&I lending was not measured by the proxy because the loans were residentially secured (this lending is captured in the Call Report as home mortgage loans).

We find that banks do a considerable amount of lending to firms with GAR above $1 million but below their internal thresholds. Banks with $1 billion to $10 billion in assets that use a formal GAR threshold made a total of 29 percent of their C&I loans to businesses that they consider small: 18.7 percent to firms with GAR below $1 million and 10.3 percent to firms with GAR above $1 million but below their internal threshold (Table 1). This means that more than one-third of self-described small business lending by these banks is to firms that would be excluded under the $1 million GAR definition. If we broaden our scope to include banks with more than $10 billion in assets, we find that nearly two-thirds of self-described small business lending made to firms with GAR above $1 million.

Table 1		
Share of New C&I Originations		
Banks With $1 Billion or More in Assets That Use a Formal GAR Threshold (Percent Loan-Weighted)		
	Small Banks	**All Banks**
Firm GAR	**$1B to Less Than $10B**	**$1B or More**
Less Than $1 Million	18.7%	6.6%
Between $1 Million and Internal Bank GAR Threshold	10.3%	13.0%
Source: Small Business Lending Survey (SBLS) Questions 8, 10, and 11. Note: GAR is gross annual revenue. See Appendix C of the 2018 SBLS report for the survey instrument. SBLS responses are loan-weighted to represent the proportion of U.S. industry lending for banks of these sizes that use a formal GAR threshold.		

Our working assumption from these findings is that for the typical bank, a GAR threshold of $1 million is overly conservative and would exclude many firms that should properly be considered small businesses. A GAR threshold of $10 million (the original small business size metric proposed by the FFIEC in 1992) would safely capture these larger small businesses but may include larger firms that certain banks might not consider small.[35] Given the lack of consensus on the correct definition of a small business, we present results using both thresholds wherever possible.

3 Assessment of the Accuracy and Precision of the Proxy in Measuring Small Business Lending

In this section, we assess whether and to what degree the proxy diverges from its underlying assumptions (that small loans are made to small businesses and large loans to large businesses). We do this by filling in the cells of Figure 2 using data from the SBLS, apportioning small and large C&I loans by firm size. We then explore the implications of any inaccuracy if relying on the proxy as a measure of actual small business lending. Finally, we investigate the dispersion of the bank-level difference between the proxy and true small business lending, and whether the proxy can properly identify which of two individual banks makes a larger proportion of their C&I loan dollars to small businesses.

Only banks with $1 billion or more in assets were asked the survey questions that we rely on in this section. Unfortunately, the number of large banks—those with assets greater than $10 billion—that responded to these questions fell below the allowable reporting threshold for protecting respondents' identities. Therefore, our analysis is primarily limited to banks with $1 billion to $10 billion in assets.[36] No separate analysis is provided for large banks; however, responses for large banks are sometimes incorporated if the additional data improve the precision of estimates.

---

[35] Using the $10 million GAR threshold from the SBLS data does not imply that we are measuring actual lending to businesses of this size but rather that we are capturing lending to any business below this size.

[36] As of year-end 2018, these banks held 10.5 percent of outstanding domestic C&I loans and 15.9 percent of outstanding proxy loans.

3.1 Accuracy of the Proxy in Measuring Small Business Lending

We find that relying on the proxy to measure small business lending results in considerable gross misstatement (combining both overstatement and understatement), regardless of which GAR threshold is used to define small businesses. Table 2 shows the *proportion* of outstanding loan balances within each of the cells of Figure 2 for banks with $1 billion to $10 billion in assets, using the $1 million GAR threshold in panel A and the $10 million threshold in panel B.[37] With either threshold, we find substantial gross misstatement, with more than one-third of outstanding C&I balances in the form of large loans to small businesses (Cell B, gross understatement) or small loans to large businesses (Cell C, gross overstatement). If the proxy were a perfect measure of small business lending, then these cells would both equal zero.

In addition to this gross misstatement of small businesses lending, we also find substantial net misstatement, with the direction of that net misstatement hinging on whether the small business threshold is set at $1 million or $10 million GAR. Net overstatement is calculated as the gross overstatement (Figure 2, Cell C) less the gross understatement (Figure 2, Cell B). For banks with $1 billion to $10 billion in assets, we find a net *over*statement of 15 percent when using a GAR threshold of $1 million (Table 2, panel A). In contrast, at the $10 million GAR threshold, we find a net *under*statement of 23.1 percent (Table 2, panel B). However, we know from the previous section that a GAR of $1 million is unlikely to be the current maximum small business size; further, the $10 million GAR threshold captures all lending *below* rather than *at* that threshold. Therefore, it is safe to assume that the proxy on net understates lending to small businesses by banks with $1 billion to $10 billion in assets.

Table 2							
Share of Outstanding C&I Loan Balances							
Banks With $1 Billion to $10 Billion in Assets (Percent Loan-Weighted)							
A. $1 Million GAR Threshold							
		<=$1M		**>$1M**	**Small Business Lending Proxy (A+C)**	**Metrics**	
Small Loans	(A)	12.9%	(C)	24.7%	37.6%	$p_1=A/(A+C)$	0.343
Large Loans	(B)	9.7%	(D)	52.7%		$p_2=B/(B+D)$	0.155
Loans to Small Firms (A+B)		22.6%				$q=A/(A+B)$	0.571
Gross Misstatement (B+C)		34.4%					
Net Overstatement (C-B)		15.0%				$r=p_2/p_1$	0.453
B. $10 Million GAR Threshold							
		<=$10M		**>$10M**	**Small Business Lending Proxy (A+C)**	**Metrics**	
Small Loans	(A)	28.3%	(C)	7.5%	35.8%	$p_1=A/(A+C)$	0.791
Large Loans	(B)	30.6%	(D)	33.6%		$p_2=B/(B+D)$	0.477
Loans to Small Firms (A+B)		58.9%				$q=A/(A+B)$	0.480
Gross Misstatement (B+C)		38.1%					
Net Overstatement (C-B)		-23.1%				$r=p_2/p_1$	0.603

Sources: Small Business Lending Survey (SBLS) Question 14 and fourth quarter 2015 Call Reports.

Note: See Appendix C of the 2018 SBLS report for the survey instrument. See text box below for descriptions and interpretations of the proxy accuracy metrics presented. SBLS responses are loan-weighted to represent the proportion of U.S. industry lending for banks with $1 billion to $10 billion in assets.
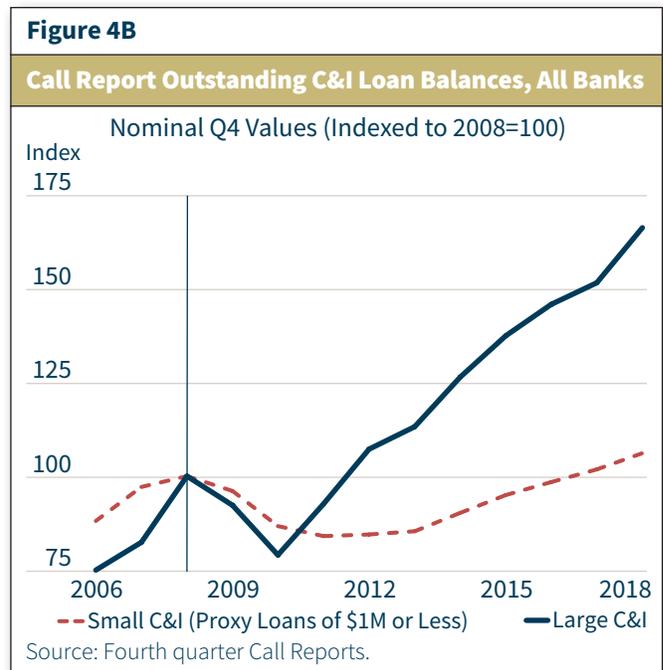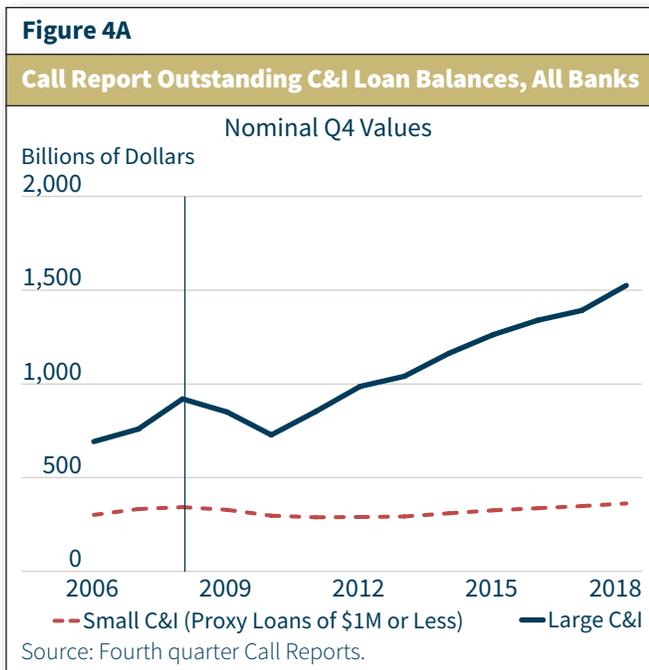
---

[37] The SBLS also asked questions about new C&I loan originations to businesses of greater than $1 million GAR. The results on the mismatch between the proxy measure and actual lending to businesses using responses to the originations questions are consistent with the results presented here based on outstanding loan balances.

It is also helpful to consider how loans to small businesses are distributed between small and large loans. We denote the fraction of small business bank lending that is small business loans $q = A/(A+B)$. (Box 1 presents a summary of the proxy accuracy metrics that we present in this section.) The assumption embedded in the proxy is that all bank loans to small businesses are small, so that $q = 1$. This assumption is strongly rejected by the data, regardless of the threshold used; $q = 0.571$ at the \$1 million GAR threshold and $q = 0.480$ at the \$10 million GAR threshold. Therefore, nearly half, or possibly even more than half, of the loans banks make to small businesses are actually large. That small businesses rely more on large dollar loans than previously assumed carries serious implications for how we view the recovery of small business lending after the Great Recession, if we rely on proxy data as a measure.

Box 1

	Proxy Accuracy Metrics	
Metric	**Description**	**Interpretation**
$q = A/A+B$	Proportion of loans to small businesses that are below \$1 million at origination	$q = 0 \rightarrow$ All loans to small businesses are large loans $q = 1 \rightarrow$ *All loans to small businesses are small loans (proxy assumption)*
$p_1 = A/A+C$	Proportion of small C&I loans (below \$1 million at origination) to small businesses	$p_1 = 0 \rightarrow$ No small loans are made to small businesses $p_1 = 1 \rightarrow$ *All small loans are made to small businesses (proxy assumption)*
$p_2 = B/B+D$	Proportion of large C&I loans (above \$1 million at origination) to small businesses	$p_2 = 0 \rightarrow$ *No large loans are made to small businesses (proxy assumption)* $p_2 = 1 \rightarrow$ All large loans are made to small businesses
$r = p_2/p_1$	Ratio of p_2 to p_1 An inverse measure of validity of proxy's assumptions (Range: 0 to ∞)	$r = 0 \rightarrow p_2 = 0$, *No large loans are made to small businesses (proxy assumption)* $r = 1 \rightarrow p_1 = p_2$. An equal proportion of small loans and large loans are made to small businesses. Proxy contains no information about small business lending r to $\infty \rightarrow p_1$ to 0 and p_2 to 1. No small loans are made to small businesses and all large loans are made to small businesses

3.2 The Proxy and Small Business Lending Since the Great Recession

The standard narrative since the Great Recession is one of a slow recovery for small business lending, based, in part, on the slow rebound observed for the proxy. Figures 4A and 4B show how domestic C&I lending in the banking industry has evolved since 2006 for both the small loans comprising the proxy for small business lending (dashed line) and for C&I loans of more than \$1 million (solid line). Figure 4A shows the evolution in nominal dollars, which highlights that larger C&I loans are far greater in magnitude than small C&I loans, while Figure 4B shows both series indexed to their own year-end 2008 values, allowing for an easier comparison of their growth in the pre-recession and post-recession periods. Both large and small loan volumes grew rapidly in the years before the recession, peaked in 2008 as the recession unfolded, and declined rapidly for the next several years. Large C&I loans reached their lowest point in 2010, having dropped 21 percent from the 2008 peak. These loans bounced back quickly, however, exceeding their 2008 peak in 2012. By the end of 2018, large C&I loans were roughly 66 percent higher than they were in 2008. By contrast, the proxy reached its lowest point in 2011, 16 percent below its 2008 value, but it recovered much more slowly. By the end of 2017, the proxy barely exceeded its 2008 level, and it stood only 6 percent higher in nominal terms at the end of 2018 than it did in 2008.

Figure 4A	
Call Report Outstanding C&I Loan Balances, All Banks	

Nominal Q4 Values

Figure 4B	
Call Report Outstanding C&I Loan Balances, All Banks	

Nominal Q4 Values (Indexed to 2008=100)

--- Small C&I (Proxy Loans of $1M or Less)   —Large C&I
Source: Fourth quarter Call Reports.

These trends are often interpreted as indicating that small business lending recovered slowly from the Great Recession; however, this interpretation relies heavily on the assumption that small businesses receive only small loans from banks, when we have shown that they draw their bank lending roughly equally in small and large loans, at least for banks with $1 billion to $10 billion in assets. The true evolution of bank lending to small businesses since the crisis therefore likely runs somewhere between the two lines of Figure 4B.

Guided by the results for banks with $1 billion to $10 billion in assets, we can calculate how true small business lending grew under different assumptions. Specifically, we can look at the propensity of small loans to be made to small businesses, defined as $p_1 = A/(A+C)$, and the propensity of large loans to be made to small businesses, defined as $p_2 = B/(B+D)$, and use these metrics to derive true small business lending.[38] The assumptions underpinning the proxy are that $p_1 = 1$ (all small loans are made to small businesses) and $p_2 = 0$ (all large loans are made to large businesses). The data reject these assumptions, regardless of which GAR threshold is used to define small businesses. The point estimate for p_1 is 0.343 using the $1 million GAR threshold, meaning that for every dollar in small C&I lending, businesses under $1 million GAR receive 34.3 cents (Table 2, panel A). Similarly, the point estimate for p_2 is 0.155, indicating that those businesses receive 15.5 cents for every dollar of large C&I lending.

Therefore, for any given p_1 and p_2, we can calculate true outstanding small business lending at any point in time by multiplying the dollar value of total outstanding small C&I loans by p_1, multiplying the dollar value of total outstanding large C&I loans by p_2, and summing the two values.[39] It would, however, be inappropriate to simply plug in the point estimates from Table 2 as they not only represent a fairly small fraction of lending by the banking industry (by banks of $1 billion to $10 billion in assets), they also are substantially different based on whether we use the $1 million or $10 million GAR threshold. For ease of presentation, we can summarize both p_1 and p_2 into their ratio, $r = p_2/p_1$, and show the evolution of outstanding small business lending over time when we assume different values for r, relative to a baseline year.
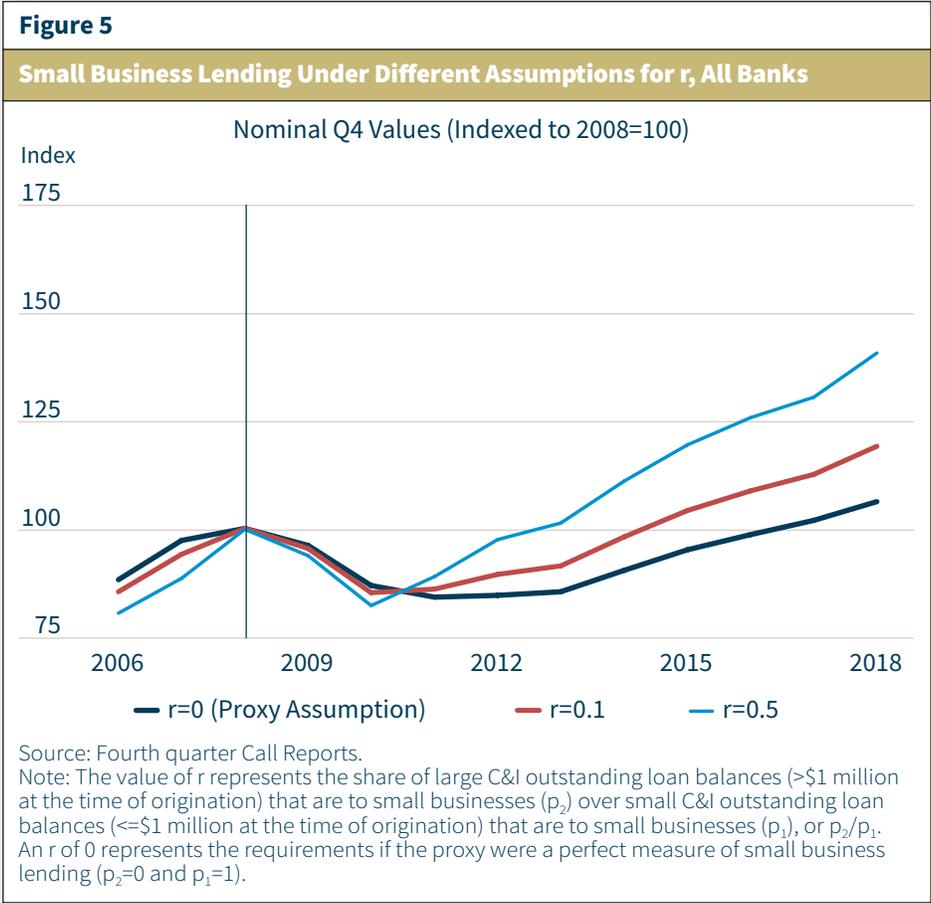
For this metric, when $r = 0$ (which can only occur when $p_2 = 0$), no large loans are made to small businesses; small business lending is then a fixed proportion of small C&I lending, and its percentage growth over time is the same as that of

---

[38] Note that the data we use here is on outstanding loan balances rather than originations.

[39] As discussed in Appendix B, this formula relies on the assumption that p_1 and p_2 do not vary over time, which is likely an oversimplification. It is, however, a much weaker assumption than what is required to use the proxy, which assumes that $p_1 = 1$ and $p_2 = 0$, and that both values do not vary over time.

the proxy. On the other hand, $r = 1$ implies that $p_1 = p_2$, so an equal proportion of small and large loans are made to small businesses, and small business lending is proportionate to total C&I lending. An $r > 1$ implies that $p_1 < p_2$ so that a larger proportion of large loans than small loans are made to small businesses. That scenario is unlikely, however; for banks with $1 billion to $10 billion in assets, r is estimated to be 0.453 at the $1 million GAR threshold and 0.603 at the $10 million GAR threshold (Table 2).

We can therefore apply different values of r to industry-level Call Report data to provide alternate estimates of the evolution of bank lending to small businesses over time.[40] This allows us to account for the fact that a nontrivial amount of large C&I loans are directed to small businesses and small C&I loans to large businesses without tying ourselves to a particular value of r. Figure 5 shows the evolution of industry-aggregate outstanding small business lending (including banks of all sizes that file Call Reports) under three assumptions: $r = 0$ (equivalent to using the proxy trend), $r = 0.1$, and $r = 0.5$, all indexed to 2008 in the manner of Figure 4B. In the more conservative model, where $r = 0.1$ (which would be consistent with 50 percent of small loans and 5 percent of large loans being made to small businesses), small business lending still recovers substantially faster than indicated by the proxy. Under this assumption, small business lending regained its 2008 peak in 2015 instead of 2017, and as of 2018 it would be up 18.9 percent from its 2008 level instead of 6.1 percent. The more aggressive model with $r = 0.5$, which is more in line with what we find in the data, locates the recovery point in 2013 and shows a 2018 level that is 40.7 percent higher than the 2008 peak. Overall, these adjustments suggest that small business lending recovered much more quickly than previously believed.

Figure 5

Small Business Lending Under Different Assumptions for r, All Banks

Nominal Q4 Values (Indexed to 2008=100)

— r=0 (Proxy Assumption)　　— r=0.1　　— r=0.5

Source: Fourth quarter Call Reports.
Note: The value of r represents the share of large C&I outstanding loan balances (>$1 million at the time of origination) that are to small businesses (p_2) over small C&I outstanding loan balances (<=$1 million at the time of origination) that are to small businesses (p_1), or p_2/p_1. An r of 0 represents the requirements if the proxy were a perfect measure of small business lending ($p_2=0$ and $p_1=1$).

---

[40] See Appendix B for details on how we construct our alternate small business lending estimates, including the derivation of how r is a sufficient statistic for p_1 and p_2.

The fact that the overall view of the recovery of small business lending after the Great Recession changes substantially when we slightly relax the proxy assumptions suggests that researchers should be cautious about relying on the proxy. Many research papers use either the volume of proxy lending or the ratio of the proxy to total assets as an outcome variable to measure small business lending. While the inaccuracy of the proxy does not necessarily invalidate the findings of those papers, they suggest that care should be taken in how these findings are interpreted. Scholars could increase confidence in their empirical results by adapting the methodology provided in Appendix B into their regression frameworks and testing to see if their results hold for different values of r.

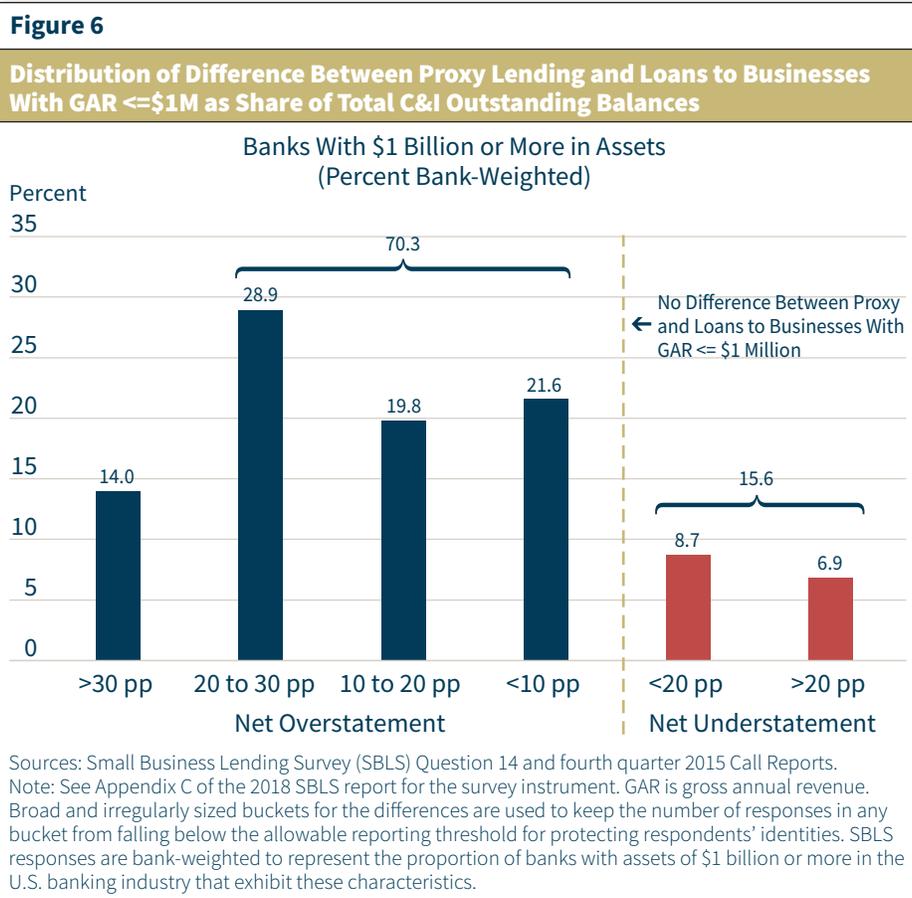### 3.3 Imprecision of the Proxy Across Banks

Despite the net and gross misstatement of small business lending by the proxy, it could still be used to rank banks by the proportion of their C&I lending that they direct to small businesses, provided that the misstatement was fairly consistent across all banks. At one extreme, if every bank under- or overstated its small business lending by the same share, then the proxy could be a valid tool for cross-bank comparisons. Alternatively, the inaccuracy of the proxy as a measure of industry-level small business lending could be driven by only a few highly inaccurate banks. For example, a small number of banks may have particular business models that result in their making many small loans to larger businesses. In this case, we would find that misstatement is close to zero for most banks, with a few highly inaccurate outliers.

We assess the precision of the proxy for measuring small business lending using the distribution of the net misstatement at the bank level (the share represented by Cell C in Figure 2 less the share of Cell B).[41] Figure 6 shows the distribution of net misstatement in terms of the percentage point (pp) difference between the share of lending measured by the proxy and the percentage of C&I lending directed to businesses under the $1 million GAR threshold.

If the proxy at the bank level was consistently inaccurate as a measure of small business lending, then we should observe mass around the industry-level overstatement of 15 percent (Table 2, panel A) between banks' share of C&I lending as measured by the proxy and their share of lending to business with $1 million GAR. We find instead that approximately 70 percent of banks have overstatement in a broader band between 0 and 30 percentage points; approximately 15 percent have overstatement above 30 percent. Further, approximately 15 percent have a proxy share that understates their lending to small businesses (defined as $1 million GAR). Only about one-fifth (19.8 percent) of banks are close to the mean overstatement of 15 percent, with a 10 to 20 percentage point overstatement (Figure 6).

In addition, the overestimation we observe with the $1 million GAR threshold is broad-based and not limited to a few "bad" or highly divergent "apples." If this were the case, then we would observe both greater mass around zero (the vertical line on Figure 6) and some mass in the higher overstatement buckets. What we find instead is that only slightly more than 30 percent of banks are in the two buckets closest to zero, which rules out the possibility that the proxy overestimation is driven by a few banks with high overstatement. Further, the median bank is in the 10 to 20 percentage point bucket (close to the mean difference) rather than closer to zero, indicating that the typical bank also exhibits large discrepancies. Overall, we find wide variation in the difference between lending collected by the proxy and banks' actual lending to small businesses, and these differences are not driven by the behavior of a small number of banks.

---

[41] Because this exercise requires a larger sample size to identify the distribution of net misstatement (and not just the mean), we make several choices to expand our sample and thus keep the number of responses in any category from falling below the allowable reporting threshold for protecting respondents' identities. This includes exclusively using the $1 million GAR threshold (which had a higher response rate than the $10 million GAR threshold), including all banks with more than $1 billion in assets, and using broad and irregularly sized buckets. In addition, unlike previous calculations, we use bank-weighting rather than loan-weighting, since we are assessing precision at the bank level rather than accuracy at the industry level.

Figure 6

Distribution of Difference Between Proxy Lending and Loans to Businesses With GAR <=$1M as Share of Total C&I Outstanding Balances

Banks With $1 Billion or More in Assets
(Percent Bank-Weighted)

Sources: Small Business Lending Survey (SBLS) Question 14 and fourth quarter 2015 Call Reports.
Note: See Appendix C of the 2018 SBLS report for the survey instrument. GAR is gross annual revenue. Broad and irregularly sized buckets for the differences are used to keep the number of responses in any bucket from falling below the allowable reporting threshold for protecting respondents' identities. SBLS responses are bank-weighted to represent the proportion of banks with assets of $1 billion or more in the U.S. banking industry that exhibit these characteristics.

Using the lower GAR threshold of $1 million, we find that the proxy overstates small business lending for the vast majority of banks with more than $1 billion in assets, mirroring the net overstatement shown in Table 2, panel A. However, our intent is not to suggest that a GAR threshold of $1 million is more appropriate; rather, given the data available, that threshold allows us to document that, across banks, the difference between the lending measured by the proxy and actual lending to small businesses has a broad and relatively thick-tailed distribution, suggesting an imprecise relationship between the two.

3.4 Ranking Banks Using the Proxy

One consequence of this high dispersion in net misstatement across banks is that the proxy may be unable to consistently identify which banks are truly doing more small business lending. We investigate this by pairing each bank in our sample that has $1 billion to $10 billion in assets with all other similarly sized banks in the sample and comparing their proxy shares of lending and their actual shares of outstanding C&I lending to businesses with under $1 million GAR.[42] For each pair, we determine both whether the bank with a lower observed proxy share makes a greater proportion of its lending to these smallest of businesses, and if the bank with a lower proxy share makes a much greater proportion of its lending to these small businesses (more than a 25 percentage point difference).[43] If the proxy were a perfect measure of small business lending (or if the proxy uniformly misstated actual small business lending for all banks by the same share), we would expect the bank with the higher proxy share to always make a higher share of actual lending to small businesses than the paired comparison bank. If the proxy were entirely unrelated to actual small business lending, then banks with a lower proxy share would make a

---

[42] For example, if we had ten banks in our sample, indexed one to ten, we would end up with 45 pairs: bank one and bank two, bank one and bank three, bank one and bank four, and so on.

[43] For each pair, we created an indicator variable for whether the bank in the pair with the lower proxy share made a higher proportion of lending to businesses with under $1 million GAR, and another indicator variable for whether the bank in the pair with the lower proxy share made a much higher (more than 25 percentage points) proportion of their C&I lending to small businesses.

higher share of lending to small businesses than paired banks approximately half of the time. Banks with a lower proxy share of lending make greater shares of actual lending to small businesses in 25.9 percent of the bank pairs, and 8.3 percent of bank pairs show more than a 25 percentage point difference. (Table 3, panel A).[44] These findings are consistent with our earlier results; the proxy contains information about small business lending but shows limited ability to identify whether one bank is more likely than another to concentrate its C&I lending to small businesses.

Table 3		
Share of Bank Pairs That Exhibit These Characteristics		
Banks With $1 Billion to $10 Billion in Assets (Percent Bank Pair-Weighted)		
	Mean	**Standard Error**
A. All Responding Bank Pairs		
Bank With Lower Proxy Has Higher Outstanding Balances to Firms With <$1M GAR	25.9%	(0.93)
Bank With Lower Proxy Has >=25pp Higher Outstanding Balances to Firms With <$1M GAR	8.3%	(0.59)
B. Only Bank Pairs With >=0.25 Difference in Respective Call Proxies		
Bank With Lower Proxy Has Higher Outstanding Balances to Firms With <$1M GAR	17.8%	(1.23)
Bank With Lower Proxy Has >=25pp Higher Outstanding Balances to Firms With <$1M GAR	5.4%	(0.74)
Sources: Small Business Lending Survey (SBLS) Question 14 and fourth quarter 2015 Call Reports. Note: GAR is gross annual revenue. See Appendix C of the 2018 SBLS report for the survey instrument. SBLS responses are bank-weighted to represent the proportion of bank pairs with assets of $1 billion to $10 billion in the U.S. banking industry that exhibit these characteristics.		

Having a much higher proxy lending share than another bank also does not ensure that a bank will have a higher proportion of its C&I portfolio in small business lending. In 17.8 percent of bank pairs in which the difference between the two banks in their proxy shares is 25 percentage points or more, the bank with the lower proxy share has a higher proportion of small business lending (Table 3, panel B). Therefore, the weak correlation between the lending measured by the proxy and actual lending to small businesses calls into question the reliability of using the proxy to identify which banks are lending a greater share of their individual C&I portfolio to small businesses, even for much higher proxy share banks.

4 Overall Accuracy of the Proxy: Banks With Less Than $1 Billion in Assets

To assess the overall accuracy of the proxy as a measure of small business lending for the smallest banks, those with assets of less than $1 billion,[45] we rely on a qualitative Yes/No question asked of all banks in the SBLS: "*For calendar year 2015, do you consider largely all of the loans made by your bank for Commercial and Industrial (C&I) purposes to have been made to borrowers that you consider to be small businesses?*"[46]

A majority (83.0 percent) of banks with less than $1 billion in assets responded affirmatively to the "largely all" survey question, compared with slightly more than one-third of banks with $1 billion to $10 billion in assets and about one-tenth (11.6 percent) of the largest banks (Table 4). Clearly, smaller banks are more likely than larger banks to focus their C&I lending activities on small businesses. In the following analysis, we refer to banks that report making largely all of their C&I loans to small businesses as "small business-focused" (or "focused") and those that do not as "non-focused."

---

[44] We conducted a similar exercise using SBLS Question 8 in Appendix C of FDIC (2018) on total new loan originations and Question 10 on new originations to firms with less than $1 million GAR, and found similar results.

[45] FDIC (2018) contains a different and simpler version of this analysis, which considered only the possibility of gross underestimation, used highly conservative estimates, and relied on aggregate data rather than microdata.

[46] The term "largely all" rather than "all" was used in the survey question given banks' concerns, shared during field testing interviews, about potentially misrepresenting themselves to bank regulators by responding affirmatively to an all-inclusive statement. See Section II footnote 12 of FDIC (2018).

Table 4		
Share of Banks Reporting Largely All of Their C&I Loans Made to Borrowers Bank Considers Small		
(Percent Bank-Weighted)		
Less Than $1B	**$1B to Less Than $10B**	**$10B or More**
83.0%	37.0%	11.6%

Source: Small Business Lending Survey (SBLS) Question 2.

Note: See Appendix C of the 2018 SBLS report for the survey instrument. SBLS responses are bank-weighted to represent the proportion of banks in the U.S. banking industry that exhibit these characteristics.

If the proxy is an accurate portrayal of small business lending at the bank level, we expect to find that focused banks have high proxy shares and that non-focused banks have low proxy shares. Banks that report focusing on small business lending but have low proxy shares are likely making C&I loans to small businesses in ways not fully captured by the proxy, either because the loans were over $1 million at origination or because the bank is making loans for C&I purposes that are not categorized as C&I loans.[47] The reverse argument applies for non-focused banks with high proxy shares of C&I lending. The thrust of our analysis is to correct for lending by banks with proxy shares inconsistent with their answers to the qualitative Yes/No survey question.

We find that banks with less than $1 billion in assets generally have a small business lending focus consistent with their proxy shares, but that a substantial minority of C&I loans are made by focused banks with low proxy shares and non-focused banks with high proxy shares. More than half (56.2 percent) of aggregate C&I lending is by focused banks with high individual proxy lending shares and 15.5 percent by non-focused banks with low proxy shares, for a total of 71.7 percent of the market (Table 5). However, 28.3 percent of industry-level C&I lending is by banks whose focus on small business lending is not consistent with their proxy share of lending (18 percent by focused banks with low proxy shares and 10.3 percent by non-focused banks with high proxy shares).

Table 5		
Share of Industry-Level C&I Outstanding Loan Balances by Whether Banks Focus Their C&I Lending to Small Businesses and Proxy Share		
Banks With Less Than $1 Billion in Assets **(Percent Loan-Weighted)**		
Proxy Share of Total C&I Lending	**Focused**	**Non-Focused**
Below 50%	18.0%	15.5%
Above 50%	56.2%	10.3%
Total	74.2%	25.7%

Sources: Small Business Lending Survey (SBLS) Question 2 and fourth quarter 2015 Call Reports.

Note: See Appendix C of the 2018 SBLS report for the survey instrument. SBLS responses are loan-weighted to represent the proportion of U.S. industry lending for banks with less than $1 billion in assets.

Our approach to determining misstatement among the smallest banks is to (1) identify banks with mismatched survey-reported focus and Call Report proxy shares, (2) reasonably adjust their proxy shares to match their focus, (3) recalculate small business lending at the industry level, and (4) compare this recalculated small business lending to the original proxy.[48] We adjust the proxy share by setting a ceiling for non-focused banks and a floor for focused bank: proxy shares of non-focused banks are downwardly adjusted if the share is above the ceiling, and proxy shares of focused banks are upwardly adjusted if
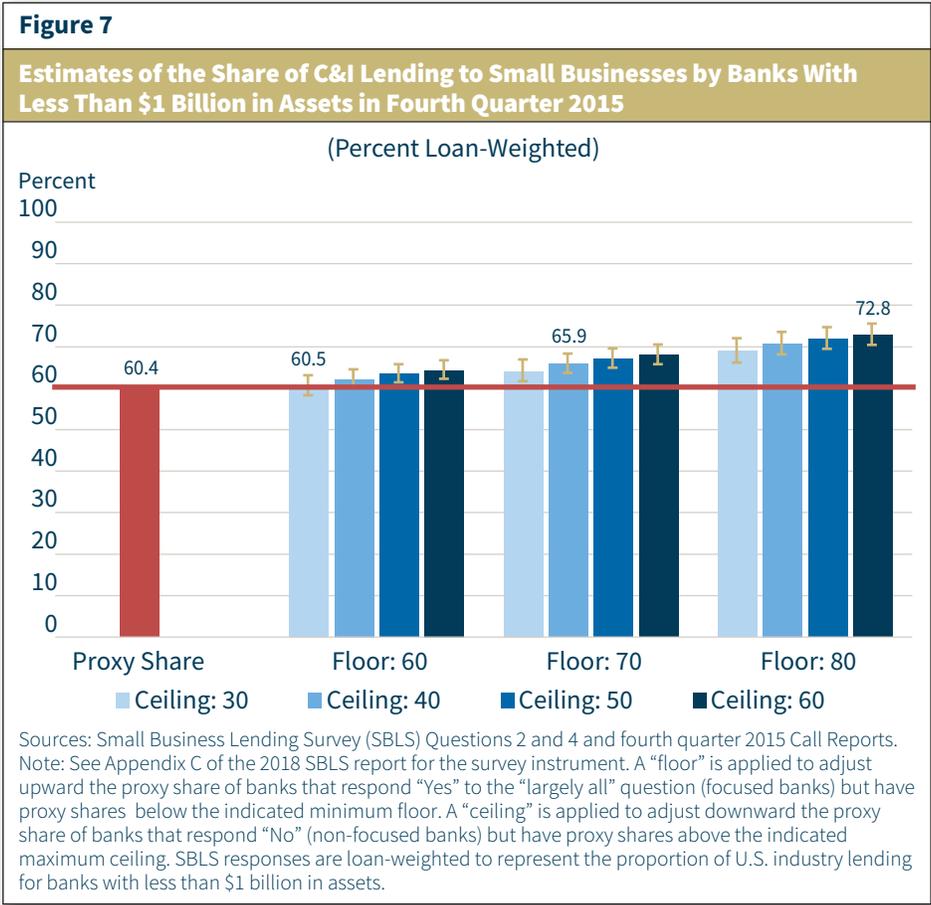
---

[47] See Section II of FDIC (2018) for a more detailed discussion of this issue.

[48] See Appendix C for a technical description of the adjustment process.

the share is below the floor. This approach reduces the small business lending by non-focused banks with implausibly high proxy shares (such as a bank that does not consider "largely all" of its C&I lending to be to small businesses and yet has a proxy share of 90 percent) and increases the small business lending by focused banks with implausibly low proxy shares (such as a bank that considers "largely all" its lending to be to small businesses and yet has a proxy share of 25 percent). Since there are multiple plausible interpretations of "largely all," we use several floor and ceiling assumptions.

For example, suppose we used a floor of 60 percent and a ceiling of 40 percent. For the non-focused bank with a proxy share of 90 percent, we would downward-adjust their share of proxy lending to the 40 percent ceiling. The proxy lending share for a non-focused bank with a proxy share of 25 percent would not be adjusted, as their share is already below the ceiling. Similarly, proxy lending share for a focused bank with a proxy share of 90 percent would not be adjusted, as it is above the floor. But proxy lending share for a focused bank with a proxy share of 25 percent would be upwardly adjusted to the 60 percent floor.

Under a range of reasonable assumptions, we find evidence that the proxy mildly understates true small business lending by banks with less than $1 billion in assets. Figure 7 shows estimates and 95 percent confidence intervals of the small business share of C&I lending of these-sized banks at the industry level, using different floor and ceiling assumptions, as well as the unaltered proxy share on the left. The estimates range from 60.5 percent to 72.8 percent, with the lower bounds of their confidence intervals mostly above the proxy share of 60.4 percent. This suggests that the proxy understates rather than overstates small business lending by the smallest banks. Under a moderate set of assumptions (a ceiling of 40 percent small business lending for non-focused banks and a floor of 70 percent for focused banks), we find an estimate of 65.9 percent, 5.5 percentage points greater than the proxy share.

Figure 7

Estimates of the Share of C&I Lending to Small Businesses by Banks With Less Than $1 Billion in Assets in Fourth Quarter 2015

(Percent Loan-Weighted)

Sources: Small Business Lending Survey (SBLS) Questions 2 and 4 and fourth quarter 2015 Call Reports. Note: See Appendix C of the 2018 SBLS report for the survey instrument. A "floor" is applied to adjust upward the proxy share of banks that respond "Yes" to the "largely all" question (focused banks) but have proxy shares below the indicated minimum floor. A "ceiling" is applied to adjust downward the proxy share of banks that respond "No" (non-focused banks) but have proxy shares above the indicated maximum ceiling. SBLS responses are loan-weighted to represent the proportion of U.S. industry lending for banks with less than $1 billion in assets.

5 Conclusions

In this study, we use novel data from the FDIC's Small Business Lending Survey to assess how well C&I loans of under $1 million at origination proxy for lending to small businesses. By using questions that provide a coarse disaggregation of lending by loan and firm size, we are able to investigate the accuracy of the proxy for banks with $1 billion to $10 billion in assets, the implications of inaccuracies for interpreting overall small business lending trends, the dispersion of bank-level differences between the observed proxy and actual small business lending, and whether the proxy can reliably identify whether one bank has a greater share of its C&I portfolio in small business lending relative to another.

We investigated to what extent the basic assumptions behind the proxy— small loans are extended to small firms and large loans are extended to large firms—hold. We find that these two assumptions are not well-supported by the analysis. For banks with $1 billion to $10 billion in assets, large shares of small business lending are grossly misstated if relying on the proxy. This is true using either of the small business size thresholds available in the survey data. More than 30 percent of C&I lending by banks with $1 billion to $10 billion in assets are small loans to large firms or large loans to small firms.

The direction of overall net misstatement depends critically on the maximum small business size assumed. For banks with assets of $1 billion to $10 billion, the proxy, on net, substantially overestimates small business lending if relying on a GAR of less than $1 million to identify small businesses, but it substantially underestimates small business lending if using a GAR of less than $10 million. Given that a GAR of $10 million likely captures more true small business lending than a GAR of $1 million, the proxy likely net understates these banks' lending to U.S. small businesses by up to 23 percent, as a share of the banks' aggregate industry-level C&I lending.

Limitations of the proxy for measuring small business lending have repercussions for an understanding of small business lending trends. The common narrative of small business lending after the Great Recession highlights its slow recovery, based in part on the recovery observed if relying on the proxy. However, if we weaken the assumptions underlying the proxy to match banks' actual small business lending activity observed from the survey data (where some small loans go to larger firms and some large loans to go to small firms), small business lending by the banking industry recovers much faster, reaching its previous high two to four years earlier than previously believed.

Further, we find that banks exhibit wide dispersion in how much the proxy over- or understates their small business lending. This variation raises questions about the ability of the proxy to correctly rank banks in terms of the shares of their C&I portfolio devoted to small business lending; approximately one-quarter of the time when two banks are compared, the bank with the lower proxy share actually makes a larger proportion of its lending to small businesses, as measured by the survey data.

Taken together, these findings suggest that the proxy—while reliably collecting data on small loans to businesses—should be used with caution. When relying on the proxy to measure small business lending, alternate data sources should also be used and robustness tests under different assumptions should be implemented.

Finally, for the smallest banks, those with less than $1 billion in assets, we conduct a simple exercise to assess the overall accuracy of the proxy for measuring small business lending by these banks. We rely on a qualitative question on whether the bank focuses its C&I lending to small businesses, combined with some reasonable assumptions, to either upwardly or downwardly adjust the bank's proxy share of industry-level C&I loans. We find that the proxy likely only mildly understates small business lending for the smallest banks.

References

"A Guide to CRA Data Collection and Reporting." Federal Financial Institutions Examination Council. https://www.ffiec.gov/cra/guide.htm.

Berger, Allen N., Nathan H. Miller, Mitchell A. Petersen, Raghuram G. Rajan, and Jeremy C. Stein. "Does Function Follow Organizational Form? Evidence From the Lending Practices of Large and Small Banks." *Journal of Financial Economics* 76, no. 2 (2005): 237–69. https://doi.org/10.1016/j.jfineco.2004.06.003.

Berger, Allen N., and Gregory F. Udell. "Small Business Credit Availability and Relationship Lending: The Importance of Bank Organisational Structure." *The Economic Journal* 112, no. 477 (February 2002): F32–F53. https://doi.org/10.1111/1468-0297.00682.

Bordo, Michael, and John Duca. 2018. "The Impact of the Dodd-Frank Act on Small Business." National Bureau of Economic Research Working Paper 24501.

Cole, Rebel. 2018. "How Did Bank Lending to Small Business in the United States Fare After the Financial Crisis?" U.S. Small Business Administration Research Study 438.

"Community Banks: Effect of Regulations on Small Business Lending and Institutions Appears Modest, but Lending Data Could Be Improved." U.S. Government Accountability Office, September 5, 2018. https://www.gao.gov/reports/GAO-18-312/.

Cortés, Kristle, Yuliya Demyanyk, Lei Li, Elena Loutskina, and Philip E. Strahan. "Stress Tests and Small Business Lending." *Journal of Financial Economics* 136, no.1 (2020): 260-279. https://doi.org/10.1016/j.jfineco.2019.08.008.

Dilger, Robert Jay. "Small Business Size Standards: A Historical Analysis of Contemporary Issues." Congressional Research Services (February 1, 2019).

Federal Deposit Insurance Corporation. 2018. *FDIC Small Business Lending Survey 2018*. https://www.fdic.gov/bank/historical/sbls/.

Horvitz, Daniel G., and Donovan J. Thompson. "A Generalization of Sampling Without Replacement From a Finite Universe." *Journal of the American Statistical Association* 47.260 (1952): 663–685.

Reichow, Kelsey. 2017. "Small-Business Lending Languishes as Community Banking Weakens." Federal Reserve Bank of Dallas Economic Letter 12, no. 3.

Robb, Alicia M., and David T. Robinson. 2010. "The Capital Structure Decisions of New Firms." National Bureau of Economic Research Working Paper 16272.

Udell, Gregory F. "What's in a Relationship? The Case of Commercial Lending." *Business Horizons* 51, no. 2 (2008): 93–103. https://doi.org/10.1016/j.bushor.2007.10.005.

Appendix A. Weighting the Small Business Lending Survey

In this report, we are typically interested in estimating the proportion of C&I loans that are made to small or large firms, at an industry or sub-industry level. To generate these estimates using data from the SBLS, we adjust the standard Horvitz-Thompson estimator used for disproportionate stratified random samples. This estimator uses inverse probability weights to estimate the average proportions at the bank level; we further weight banks by their outstanding C&I lending to generate proportions at the industry level. This appendix derives the estimator used in most of the report and shows that it produces unbiased estimates.

Suppose we wished to determine the proportion of all C&I bank loans which are both small and that are made to small firms, which we denote a_{agg}. If we had data from every bank, we would calculate this proportion by summing up the small C&I loans to small firms at each bank and dividing by the sum of total C&I loans at each bank:

$$a_{agg} = \frac{\sum_{i \in I} A_i}{\sum_{i \in I} Z_i} \tag{1}$$

where A_i denotes the dollar value of outstanding small C&I loans to small firms, Z_i denotes total outstanding C&I loans for bank i, and I is the entire population of banks. If we denote the bank-level proportion to be $a_i = \frac{A_i}{Z_i}$ and denote $\mathbb{Z} = \sum_{i \in I} Z_i$ to be total aggregate outstanding C&I lending, we can rewrite this as:

$$a_{agg} = \frac{1}{\mathbb{Z}} \sum_{i \in I} Z_i a_i \tag{2}$$

This is simply a weighted average of a_i, weighing each observed bank by it's total outstanding C&I lending.

In addition to this loan-weighting, we must also account for the fact that the SBLS consists of a stratified random sample and not a full census, and that we will be constructing an estimate $\hat{a}_{agg}$ of a_{agg} rather than reporting the value directly.[1] Since eligible banks in different strata have different probabilities of selection, to produce an unbiased estimator we must include an inverse-probability weight (as in the commonly used Horvitz-Thompson estimator) in addition to the loan-weight. The estimator we use is:

$$\hat{a}_{agg} = \frac{1}{\mathbb{Z}} \sum_{j \in J} \frac{1}{\pi_j} Z_j a_j \tag{3}$$

where J is the set of banks included in the survey and π_j is the probability that bank j was ultimately included in the survey. Per Horvitz and Thompson (1952), the expectation of $\hat{a}_{agg}$ is equal to a_{agg}:

$$E[\hat{a}_{agg}] = E[\frac{1}{\mathbb{Z}} \sum_{j \in J} \frac{1}{\pi_j} Z_j a_j] = \frac{1}{\mathbb{Z}} \sum_{i \in I} Z_i a_i = a_{agg} \tag{4}$$

making $\hat{a}_{agg}$ an unbiased estimator of the a_{agg}. We use similar estimators for the B, C, and D cells of Table 2.

---

[1] See FDIC (2018) Appendix A for more details on the survey methodology, including strata defininitions and sample sizes.

Appendix B. Derivation of Small Business Lending Over Time Under Alternate Assumptions

This appendix describes how we calculate the time series of small business lending (indexed to 2008) under alternate assumptions from those embedded in the small business lending proxy, as discussed in Section 3. Instead of assuming that all small loans are made to small firms and all large loans are made to large firms, we assume that, across the entire banking industry, both a fixed proportion of small loans $p_1 \in [0,1]$ go to small businesses and a fixed proportion of large loans $p_2 \in [0,1]$ go to small businesses. We must still make the strong assumption that p_1 and p_2 are time-invariant. However, this is a much weaker set of assumptions than the underlying proxy assumption $p_1 = 1$ and $p_2 = 0$, as the proxy assumption implictly embeds the time-invariance assumption as well.[2] We rely solely on data from the Call Report to perform this exercise rather than supplementing with SBLS data, although our chosen parameter values are informed by results from the SBLS.

We denote observed annual aggregate small C&I loans in the Call Report (i.e. the lending included in the proxy) in year t as X_t and observed annual aggregate large C&I loans as Y_t. These values are drawn from the fourth quarter Call Report of each year, as reported in the FDIC's Quarterly Banking Profile.[3] For a given set of parameters p_1 and p_2, we can calculate annual aggregate lending to small firms S_t from X_t and Y_t:

$$S_t(p_1, p_2) = p_1 X_t + p_2 Y_t \tag{5}$$

where (as above) p_1 is the fraction of small loans made to small firms and p_2 is the fraction of large loans made to large firms, both of which we assume to be constant over time.

Because we are interested in the nominal growth of small business lending over time rather than its dollar value, we index S_t to the year 2008, denoting this indexed value M_t. Using M_t instead of S_t will allow us to reduce the parameter space by using a single parameter $r = \frac{p_2}{p_1}$ instead of assigning p_1 and p_2 independently. The definition of M_t is thus

$$M_t(p_1, p_2) = \frac{S_t(p_1, p_2)}{S_{2008}(p_1, p_2)} \tag{6}$$

Substituting the definition of S_t into this equation, we find

$$M_t(p_1, p_2) = \frac{p_1 X_t + p_2 Y_t}{p_1 X_{2008} + p_2 Y_{2008}} \tag{7}$$

$$M_t(p_1, p_2) = \frac{X_t + \frac{p_2}{p_1} Y_t}{X_{2008} + \frac{p_2}{p_1} Y_{2008}} \tag{8}$$

We can then express M_t solely as a function of the parameter r defined above:

$$M_t(r) = \frac{X_t + r Y_t}{X_{2008} + r Y_{2008}} \tag{9}$$

Note that we must maintain the assumption that p_1 and p_2 are time-invariant (and not just that r is time-invariant), even though they do not appear in the final equation. Since X_t and Y_t are in the Call Report, we can therefore construct and graph M_t at various levels of r. These time series are plotted for $r = 0.1$ and $r = 0.5$ in Figure 5.

---

[2] Technically, for the M_t index we discuss later, the small business lending proxy assumption is somewhat weaker; specifically, that $p_1 > 0$, $p_2 = 0$, and that p_1 is time-invariant. As long as no large loans go to small firms and a fixed proportion of small loans go to small firms, it makes no difference what that fixed proportion is for our understanding of small business lending in 2018 relative to small business lending in 2008.

[3] For small C&I loans, we use the data series for outstanding C&I loans of under $1 million at origination. For large C&I loans, we use the difference between outstanding domestic C&I loans to U.S. addresses and small C&I loans. All values are drawn from the Call Report data used in the third quarter 2019 Quarterly Banking Profile.

Appendix C.   Estimating Small Business Lending by Banks With Under $1 Billion in Assets

This appendix describes how we estimate small business lending by banks with under $1 billion in assets using the proxy data from the Call Report and data from the SBLS, as discussed in Section 4. In this analysis, we assume that, at least for these banks, the proxy is a generally accurate measure of the proportion of C&I loans that go to small firms, except when banks explicitly contradict this assumption in their responses to the SBLS.

First, we estimate small business lending by each individual bank by taking the proxy and, if necessary, adjusting it to match whether the bank reported a focus on small business lending in the SBLS. This adjustment is made by setting a ceiling for non-focused banks and a floor for focused banks; non-focused banks with a small business lending proxy above the ceiling are downward-adjusted to the ceiling, while focused banks with a small business lending proxy below the floor are upward-adjusted to the floor. These individual-level estimates are then weighted by the bank's sampling weight multiplied by total C&I lending to produce an industrywide estimate. These industry-wide estimates are reported, for a variety of 'floor' and 'ceiling' values, in Figure 7.

Formally, we define the following variables for each bank i based on data from the Call Report and the SBLS:

$x_i \in [0,1]$ is the proportion of outstanding C&I loans that were $1 million or less at origination (i.e., the proxy share) observed in the Q4 2015 Call Report.

$f_i \in \{0,1\}$ is the response to Question 2 of the SBLS *("For calendar year 2015, do you consider largely all of the loans made by your bank for Commercial and Industrial (C&I) purposes to have been made to borrowers that you consider to be small businesses?")*, with $f_i = 0$ indicating "no" and $f_i = 1$ indicating "yes." When $f_i = 1$ a bank is referred to as "focused" on small business lending and when $f_i = 0$ it is referred to as "non-focused."

Finally, there are two parameters that are not drawn from the data: the ceiling value $t_c \in [0,1]$ (the maximum proportion of small business lending that we allow for non-focused banks) and the floor value $t_f \in [0,1]$ (the minimum proportion of small business lending that we allow for focused banks). We estimate small business lending under a range of different assumptions for these parameters, based on how banks might reasonably interpret the meaning of the term "largely all" as used in the survey question.

The definition for small business lending $\hat{p}_i$ is then

$$\hat{p}_i = \begin{cases} t_f & \text{if } f_i = 1 \text{ and } x_i < t_f \\ t_c & \text{if } f_i = 0 \text{ and } x_i > t_c \\ x_i & \text{otherwise} \end{cases} \tag{10}$$

Appendix Figure 1 gives a visual example of the adjustments that could occur in a hypothetical dataset, for the specific case when we set $t_f = 0.7$ and $t_c = 0.4$. Each point in the figure represents a bank with q_i on the horizontal axis and the estimated small business lending $\hat{p}_i$ assigned to it on the vertical axis. Banks that did not focus on small business lending ($f = 0$, the blue dots) and had a proxy share under 0.4 were unadjusted; those with a proxy share above 0.4 were adjusted down to that ceiling. Banks that did focus on small business lending ($f = 1$, the orange triangles) and had a proxy share under 0.7 were adjusted up to the 0.7 floor; those with a proxy share above 0.7 were left unadjusted. For example, bank a is non-focused ($f_a = 0$) and has a proxy share $q_a = 0.35$, which is below the t_c threshold, and so is estimated to have a small business lending share $\hat{p}_a = q_a = 0.35$. Bank b is also non-focused ($f_b = 0$) but has a proxy share $q_b = 0.6$, above the t_c threshold, so its estimated small business lending share is $\hat{p}_b = t_c = 0.4$.

After constructing the bank-level $\hat{p}_i$, we aggregate these values into an industry-wide estimate for banks with under $1 billion in assets using a loan-weighted average (as described in Appendix A):

$$\hat{p}_{agg} = \frac{1}{\mathbb{Z}} \sum_{j \in J} \frac{1}{\pi_j} Z_j \hat{p}_j \tag{11}$$

$$\hat{P}_{agg} = \mathbb{Z} \hat{p}_{agg} \tag{12}$$

where, as in Appendix A, π_j is the probability that bank j was ultimately included in the survey and $\mathbb{Z}$ is total aggregate outstanding C&I lending.

We calculate $\hat{P}_{agg}$ based on a range of assumptions for t_f and t_c. Figure 7 shows the point estimates and 95 percent confidence intervals for $\hat{P}_{agg}$ when $t_f \in \{0.6, 0.7, 0.8\}$ and $t_c \in \{0.3, 0.4, 0.5, 0.6\}$.

Appendix Figure 1

Example Adjustments to Proxy Share

Source: Author's calculations.