

How do private firms use credit lines?

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Introduction and summary

Companies borrow from investors for a variety of reasons. For example, current sales revenue may not be enough to pay suppliers or employees; companies may wish to make long-term investments by buying new equipment or constructing new buildings; or they may want to have access to credit to deal with unforeseen circumstances. Large companies have a wide menu of choices for borrowing funds, including issuing new stock or bonds. Small companies tend to have a smaller set of options. Because such companies may also be younger than large companies and, thus, have a shorter track record, or because they may be more reliant on the performance of a small number of key employees, these firms will face more difficulty in conveying their value to the broad class of investors who participate in the bond or stock markets.

Small firms are thus often privately held (that is, their stocks are not traded on public exchanges). These *private firms* likely rely on bank loans for much of their borrowing, as banks may be better able to spend the resources to investigate the firms' prospects.¹ Such small, bank-dependent firms are vulnerable to problems in the banking system. Indeed, a number of researchers argue that monetary policy and other economic shocks that impact the supply of credit flow through banks to bank-dependent firms.²

Although banks make many traditional *spot loans*, in which the whole amount of the loan is provided to the firm, much business lending takes the form of a *credit line*, also known as a *loan under commitment*. In a loan under commitment, the bank agrees to provide funds to the firm as needed up to a pre-specified limit, at mutually agreed-upon terms and over a fixed period. As of the end of the second quarter of 2010, commercial banks held \$1.1 trillion in commercial and industrial loans on their books, but had about \$2 trillion in unused commitments (that is, the portion of the credit line not yet used) on business credit lines.³

The market for loans under commitment is important because it represents a large portion of business lending and the majority of small business finance. In addition, loans under commitment may be one channel through which monetary policy and credit shocks are transmitted to the broader economy. However, a lack of available data has made it difficult to study loans under commitment or small business lending more broadly defined. Standard government data sources on banking, such as the Reports of Condition and Income, also known as the Call Reports (produced by the Federal Financial Institutions Examination Council, or FFIEC), or the Federal Reserve System's weekly bank credit data (H.8 statistical release), do not break out business lending by the size of the borrowing firm. Publicly traded firms are required to issue quarterly reports on their balance sheet, including details of their financing, but private firms do not have such requirements.

In this article, we use a panel data set from a large bank to examine the behavior of loans under commitment made to privately held firms. The data set contains all of the characteristics of the credit lines and all of the financial information about the firms that is available to the bank.

As with any lending market, the interest rate on the loan under commitment, the collateral and other requirements for the credit line, and the amount of the

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line are jointly determined by the intersection of the bank's supply and the firm's demand. In the absence of further identifying assumptions, we will not know whether these prices and quantities change over time or differ across firms because of changes in factors driving supply or factors affecting demand for these loans. However, our data set provides us with information on both the amounts of credit that firms requested and the amounts granted. Restricting our analysis to those cases in which the amount requested is equal to the amount granted helps us to ensure that observed differences in prices and quantities across firms reflect differences in firms' demand for credit rather than differences in banks' willingness to supply credit. Still, no attempt to solve the problem of separating supply and demand is perfect, and some of our results on the determinants of credit demand may partly capture factors that affect credit supply instead.

Economists have hypothesized a number of reasons why companies might choose to borrow via credit lines rather than spot loans, including the need to hedge against the possibility of a sudden deterioration in their own creditworthiness and a desire for flexibility to be able to quickly take up new investment opportunities. We look at some of the factors that affect these and other reasons underlying the demand for lines under commitment. We find that increases in fees paid on the commitment and the interest rate charged to the firm lead to large reductions in the size of lines obtained—in other words, the demand curve does indeed slope downward with the cost of the loan. Increases in fees for overcharging the lines raise line demand (as firms presumably try to avoid such overcharges by borrowing more at the outset). Increases in mean profit growth—a proxy for future investment opportunities—lead to very large increases in credit lines, while increases in the volatility of profit growth or in cash flow (a source of internal funds) cause, respectively, large and moderate decreases in the size of lines; these results suggest that access to funds for flexibility is an important motive, as described in the model developed by Martin and Santomero (1997). We find weak evidence against models in which loans under commitment help firms to hedge against the possibility that their own credit ratings may decline; we estimate that the quantity of credit demanded is negatively related to measures of firm risk.

If firms do use credit lines to enhance their flexibility, many of the same factors that affect their demand for the size of the line will also affect their usage of the line. Firms will not want to use all of their lines, as that would leave them at risk of not being able to fund new opportunities. We test this idea by examining whether

line utilization responds to the same variables that influence line demand. With the exception of upfront fees, all variables affect line utilization in the same way as they do line size.

In the next section, we summarize the academic literature on business credit lines. We then discuss our data set and the setup for our estimation. Finally, we present our results and discuss their implications.

The economics of loan commitments

When a firm takes out a loan under commitment (or credit line), the bank commits to providing up to some amount of credit to the firm over a specified period. The firm is not obligated to take out the full amount of the credit line at once and, indeed, usually does not do so even over the entire duration of the contract. The bank charges the firm for setting up the line (known as the commitment fee); it may also charge other fees or penalties if the firm exceeds the line limit or otherwise breaks the contract. Both spot loans and credit lines usually require the firm to post collateral.

Firms face some trade-offs in choosing between spot loans and credit lines. For example, the existence of the commitment fee, holding everything else equal, makes a credit line more costly to a firm than a spot loan. The economics and finance literature provides several competing views on the relative merits of spot loans and loans under commitment and how firms choose between them.

According to one view, loan commitments allow firms to hedge against any deterioration in their own creditworthiness over the period of the loan.⁴ If a firm suffers such a deterioration, it may have trouble getting a new spot loan. Having a partly unused line of credit would provide the firm with needed funds in this case. This option would only be available if the bank was not able to use the deterioration as an excuse to cut the size of the firm's credit line.

A second body of work argues that loan commitments help private firms hedge against decreases in the aggregate supply of credit, or credit crunches.⁵ Firms may be concerned that a decrease in the supply of credit by the banking industry—such as what occurred in the aftermath of the savings and loan crisis of the early 1990s—will leave them less able to borrow. Of course, a banking industry crisis may coincide with a period of declining creditworthiness. Both of these phenomena may have been at work during the recent financial crisis. In the third quarter of 2008, commercial bank lending to businesses expanded rapidly while the fraction of loan commitments unused dropped, suggesting that businesses were drawing down their credit lines during a time when activity in other corporate

credit markets, such as that for commercial paper, was rapidly diminishing.⁶

A third view contends that loan commitments are attractive to both firms and banks because they help solve information problems that make it difficult for firms to borrow on the spot markets for loans or commercial paper.⁷ According to this view, some firms may be particularly difficult to value, perhaps because they have assets that have illiquid markets or because the firms are small and rely heavily on the work of a few key individuals. Such firms will have difficulty borrowing in the bond and commercial paper markets since it will be difficult to convey the riskiness of the securities to the broad class of investors who participate in such markets. Banks are better able to investigate the quality of the firm and monitor its behavior. Credit lines also provide more protection to the bank than spot loans because the bank may have the option of cutting the unused portion of the line if circumstances change.

A final view argues that the relative speed and flexibility offered by credit lines enables firms to take advantage of investment opportunities they might miss if they had to take the time to obtain approval for spot-market loans (see Martin and Santomero, 1997). This flexibility makes the extra costs (in the form of fees and higher interest rates) of loans under commitment worthwhile to the firm.

These reasons are not mutually exclusive; it is likely that all of them contribute, to some degree, to developments in the market for credit lines. The empirical evidence on these explanations is a bit mixed, in part because of the data availability difficulties alluded to in the introduction. Also, with a variety of explanations, it is difficult to estimate the contribution of any individual one (and many studies have focused on evaluating one of many possible explanations). Several authors have found that macroeconomic developments in the market for bank loans appear to affect the quantity and price of loans, providing support for the second view: Borrowers take out credit lines because they are concerned about decreases in the aggregate supply of credit.⁸ Shockley and Thakor (1997) find some evidence for the third view: Borrowers that appear to be harder to value (because they are less well known or have assets that are difficult to value) tend to use credit lines rather than other nonbank forms of finance, such as commercial paper.

Ham and Melnik (1987) look at the determinants of usage of credit lines (that is, conditional on having obtained a loan under commitment, what fraction of that loan is used). Using a sample of 90 nonfinancial corporations, the authors find that credit line usage is positively related to total sales, borrowed reserves, and

whether collateral is used to secure the loan; and it is negatively related to interest rate costs (specifically, risk premiums and commitment fees).

Much of this empirical work has attempted to identify what determines banks' willingness to supply credit. The papers that have focused on the demand for credit have used data on larger, publicly traded corporations. As we discuss in the next section, our data allow us to study smaller firms that are not publicly traded and, we argue, to analyze demand for credit by these firms.

Data and empirical strategy

Data

Our unique data set comes from a large commercial bank that issued lines of credit to both publicly traded and private firms. For this article, we restrict our sample to private firms with fewer than 500 employees. Our data set has independently audited quarterly balance sheet data on the firms from the second quarter of 1998 through the fourth quarter of 2002 and monthly loan performance information from the first quarter of 2001 through the fourth quarter of 2002.

Tables 1 and 2 provide some summary statistics for the firms in our sample. The top panel of table 1 gives the distribution of firms across industries and the bottom panel gives the distribution across geographical locations. The firms are distributed across seven broadly defined classes of industry, ranging from manufacturing to retail and wholesale trade to services, and are located in five northeastern states.

Table 2 provides means and standard deviations (a measure of dispersion) on other firm characteristics and balance sheet information. The mean age of the firms is about ten years. The firms on average hold just above \$2 million in total assets and have about \$630,000 in working capital. The firms in our sample have relatively robust annual growth rates of profits and sales, of about 22 percent and 25 percent, respectively. On a scale of 1 to 8, with 1 being the least risky, the average firm receives a rating of about 5. The remaining entries in the table are characteristics of the firms' credit lines. The firms incur an average of about \$1,800 in fees, paid upfront, to take out the credit line. They pay an average of 8.41 percent plus a risk premium of 39 basis points on any amount drawn from the credit line and a penalty rate of about 2 percent on any amount drawn above the stated line amount. To obtain credit lines, 95 percent of the firms in our sample used collateral to secure the line commitment, with about 19 percent using deposits at the bank and 76 percent using business assets as collateral. The average line commitment for our sample firms is a little under \$1 million. Over the two-year period covered by our sample,

firms on average draw down a little over half of their credit line.

Empirical strategy

Although we can use our data to look at correlations between the quantity and price of credit lines and other firm and industry characteristics, in the absence of further assumptions we can't be sure whether those relationships are driven by changes in the supply of loans or changes in the demand for such loans.

However, one piece of information we observe on the loans helps us identify the difference between supply and demand: We see both the amount of the loan asked for by the firm and the amount granted by the bank. We argue that if we restrict our analysis to cases where the amounts asked for and granted are the same, the resulting differences in prices and quantities across firms will reflect differences in demand for commitment lines rather than supply. You can think of this as firms submitting an application for a given line commitment where the price is posted by the bank. To see this, consider two firms that happened to demand the same amount of credit, but differed in some characteristic that led the bank to be less willing to lend to one firm than to the other. Then we should observe that for one firm, the amount supplied is equal to the amount demanded; but for the other, the amount supplied would be less than the amount initially demanded. Thus, the differences in the amount (and the price) transacted would be attributable in that case to differences in factors affecting loan supply. In contrast, by looking at cases where the amount demanded is equal to the amount supplied, we can be more confident that any differences in quantities (and prices) across firms are attributable to differences in the demand for credit across those firms. Making this restriction reduces our sample from the original data set of 1,147 firms to 637 firms. Since no identification scheme is perfect, we acknowledge that some of the factors we identify here as contributing to credit demand may also be contributing to credit supply.

By allowing us to estimate the determinants of firms' demand for loans under commitment, this approach also permits us to determine the degree to which some of the hypotheses about firms' demand for credit lines are applicable. To some extent, we can evaluate the first and third hypotheses—that firms use credit lines to hedge against deteriorations in their own credit-worthiness or to solve problems with informational asymmetries inherent to other forms of borrowing—by incorporating risk measures of the firm. It is a bit difficult in our sample to determine the role of the second hypothesis—insurance against aggregate declines in consumer credit. Although our sample period does cover the aftermath of a recession, the relative tightness

TABLE 1	
Distribution of firm characteristics	
Industry	Percent
Mining and construction	8
Manufacturing (textile, food, tobacco, furniture, printing, petroleum)	14
Manufacturing (rubber, leather, metal, machinery, equipment, electronics)	19
Transportation	2
Trade	21
Finance, insurance, and real estate	24
Services (hotels, personal and business services, auto)	3
Services (health, legal, engineering)	8
State	
Massachusetts	22
Connecticut	26
Rhode Island	7
New York	39
New Jersey	6

Notes: The total number of firms in our sample is 637. These distributions are at account origination.
Source: Panel data set from a large bank.

TABLE 2		
Summary statistics		
Variable	Mean	Standard error
Credit line commitment ^a	997,274	993,012
Utilization ^b (two-year average)	51.88	54.23
Commitment fee ^a	1,829	331
Interest rate on takedown ^b	8.41	1.44
Risk premium spread ^b	0.39	0.54
Overcharge fee spread ^b	2.01	5.11
Net profit growth ^b	22.48	6.03
Net sales growth ^b	25.32	2.94
Total assets growth ^b	12.91	59.34
Risk ratings	5.01	0.64
Net cash flow ^a	178,090	131,299
Working capital ^a	631,034	590,953
Years in business	10.03	5.78
Total assets ^a	2,009,239	1,693,984
Number of firms	637	

^aDollars.
^bPercent.
Source: Authors' calculations based on panel data set from a large bank.

of corporate credit during this period is not as great as it was during the periods studied by other authors. We can partially test the fourth hypothesis—that firms take out credit lines for their flexibility—by including proxies for the firm's likely need for funds.

Our main specification is:

$$Q_i = \beta_0 + \beta_1' Price_i + \beta_2' NetFundNeeds_i + \beta_3' Risk_i + \beta_4' Collateral_i + \beta_5' Age_i + \beta_6' Industry_i + \beta_7' State_i + \varepsilon_i.$$

Q_i is the size of the credit line normalized by firm assets; we do this normalization because credit line demand may be very different for different sizes of firm.

$Price_i$ is a set of contract pricing components, including fees charged for setting up the line, fees for overdrawing, the interest rate charged on funds drawn, and the risk premium spread.

$NetFundNeeds_i$ consists of measures of the mean and standard deviation of the firm's net need for external funds, cash flow, and working capital. Martin and Santomero's (1997) model suggests that these parameters are two important determinants of the size of credit lines. Since net need for funding is not directly observable, we need to proxy for its mean and standard deviation. The need for external funds will be greater the more investment opportunities are available. If firms are persistently able to find good investment opportunities, they will be persistently profitable. Thus, we use the mean and standard deviation of net profits over our sample as our proxy for the mean and standard deviation of net credit needs. We include cash flow and working capital because externally borrowed funds are needed less when more internal funds are available.

$Risk_i$ is the bank's risk rating for firm i .

$Collateral_i$ consists of two dummy variables—one for the use of deposits at the bank and one for the use of business assets. Collateral should matter for two reasons. First, the posting of collateral helps reduce the riskiness of the loan to the bank, and thus has some bearing on the first and third hypotheses for credit rationing. Second, collateral can be considered as one of the determinants of pricing for the loans. Because collateral has this dual role, we break it out separately from the risk and pricing terms above.

We also control for other firm-level characteristics that might affect demand for funds. Age_i represents the number of years that firm i has been in business and the number of years squared. If a younger firm faces more uncertainty about its growth prospects than an older firm, it is more likely to commit to a smaller line and use less of its line commitment. We also include dummy variables for the firm's industry ($Industry_i$) and the state in which the firm is headquartered ($State_i$).

Although we have argued that we control for one potential problem—the difficulty in separating supply from demand—we may still face another problem. It

may be the case that omitted variables that affect loan supply happen to be correlated with the regressors, thereby biasing the coefficients. However, since we include all the variables observed by the financial institution, we are confident that the errors in the regression are not related to firm characteristics that might affect the bank's supply of loans to the firm. Our approach in this regard is the same as that taken by Adams, Einav, and Levin (2009) for auto loans and Karlan and Zinman (2009) for other consumer loans.

Results

Table 3 presents the model estimates. Firms that have to pay higher upfront commitment fees, higher risk premium spreads, or higher usage fees commit to a smaller credit line, while firms that face a higher penalty for overdrawing their line commit to a larger credit line. All of the effects are economically large and statistically significant and jointly suggest that the quantity demanded is decreasing in the various pricing terms of the loan—that is, the demand curve slopes downward.

An increase of 1 percent in upfront commitment fees decreases the line commitment by about 4 percent—a surprisingly large amount, given the relatively small average size of the fees. A 1 percentage point increase in the overcharge fee spread increases the amount of the credit line by more than 6 percent. Since 1 percentage point is large relative to the average penalty, but is well within the 5 percentage points standard deviation for that variable, normal changes in the spread lead to very large changes in the size of the credit line. A 1 percentage point increase in the interest rate—an amount slightly less than one standard deviation for that variable—leads to about a 10 percent decline in the initial credit line, while an increase in the risk premium spread of 1 percentage point (about two standard deviations) reduces the initial credit line by about 18 percent.

Proxies for net funding needs also have a very large impact on credit line demand. An increase in average net profit growth, which we would expect to be positively correlated with future need for funds, of 1 percent raises credit demand by about 16 percent. An increase of 1 percent in the standard deviation of net profit growth (which we would similarly expect to be positively related with the standard deviation of net funding needs) lowers credit demand by about 15 percent. An increase in net cash flow of 1 percent lowers demand for credit by about 1.75 percent. Although this result has the right sign (since internal funds should reduce the net need for funds), its magnitude is small. Contrary to our expectations, having more working capital paradoxically raises credit line demand. This result may arise because working capital may be a

predictor of future funding needs.⁹ The net funding needs variables, as a group, have a larger effect on credit demand than any of the other explanatory variables, suggesting that the fourth hypothesis for what determines demand for loans under commitment—Martin and Santomero’s (1997) model of firms’ demand for flexibility in financing—plays an important role.

An increase of 1 point on the risk rating (on an 8-point scale of increasing risk) lowers credit demand by over 1.5 percent. From Campbell (1978) and Hawkins (1982), we would have expected that firms fearing reductions in credit ratings would have demanded more credit. Our findings here do not support that idea, if we assume that already riskier firms are more concerned about deterioration. However, it is possible that relatively less risky firms fear credit deterioration more, or pay relatively higher costs when their credit deteriorates.

The use of collateral, not surprisingly, increases the demand for credit, more so when collateral is in the form of deposits rather than in the form of business assets.

We also include, but do not report in the tables, other measures of firm characteristics that might affect credit demand. Younger firms hold larger lines of credit, perhaps because they fear deterioration in creditworthiness; each additional year in business increases credit demand by about 2 percentage points. Firms whose industry classification places them in the finance, insurance, and real estate; trade; or service sectors have larger credit lines than those in mining and construction or manufacturing. There is no substantial variation in credit line size by state location.

Credit line utilization

Conditional on having chosen the size of the credit line, firms’ draws on the line should reflect the arrival of investment opportunities. But when firms must repeatedly choose lines, line usage should also influence the timing of such choices and the size of the line. If firms employ credit lines to give them the flexibility to take advantage of investment opportunities that would otherwise disappear, they should take out a new line before the current one is used up. We frequently observe this in our data: Firms convert the unused portion of the credit line into a spot loan and take out a new line of credit.

Since utilization and the size of the credit line may therefore be jointly determined, we run the same regression as in table 3, replacing the size of the credit line with utilization (measured as a two-year average of the total amount drawn by the firm relative to the total credit line amount). The results, reported in table 4, are generally in line with expectations and the results reported in table 3.

TABLE 3

Demand for credit lines

Intercept	93.39** (39.91)
Price	
Log (commitment fee)	-4.02** (1.02)
Overcharge fee spread	6.42** (2.81)
Interest rate	-10.39** (4.09)
Risk premium spread	-17.83** (7.37)
Net funding needs	
Mean net profit growth	15.88** (6.73)
Standard deviation of net profit growth	-14.67** (5.93)
Log (net cash flow)	-1.75 (1.21)
Log (working capital)	7.80* (3.10)
Risk	
Risk rating	-1.59* (0.79)
Collateral	
Collateral (deposits)	14.83* (5.92)
Collateral (business assets)	4.17 (2.63)
Firm characteristics included	
Years in business	Yes
SIC dummies	Yes
State dummies	Yes
Adjusted R-squared	0.68
Number of observations	637

*Denotes statistical significance at a 95% confidence level.

**Denotes statistical significance at a 99% confidence level.

Notes: This table reports the results of an ordinary least squares regression of credit line amount normalized by firm assets on measures of price, net funding needs, risk, collateral, age, and firm characteristics (not reported). Heteroskedasticity-robust standard errors are in parentheses. The price measures consist of commitment fees (log thousands of dollars), overcharge fee spread, interest rate, and risk premium spread (all in percentage points). Net funding needs are represented by the mean and standard deviation of net profit growth (percent growth), net cash flow, and working capital (both log thousands of dollars). Risk rating is measured on a scale of 1–8, where 8 represents the highest risk. Collateral is measured by a dummy variable for each type. All percentage and growth rate figures are expressed as decimals. SIC indicates standard industrial classification.

Source: Authors’ calculations based on panel data set from a large bank.

We find that higher upfront commitment fees are associated with greater usage of credit lines; a 1 percent increase in such fees raises utilization by about 4 percent. This may reflect a selection effect: Firms willing to pay higher fees to establish credit lines may also be in industries in which investment opportunities arise more

TABLE 4
Usage of credit lines

Intercept	104.28** (32.58)
Price	
Log (commitment fee)	3.81** (1.45)
Overcharge fee spread	2.03* (1.02)
Interest rate	-4.74** (1.18)
Risk premium spread	-7.07* (3.47)
Net funding needs	
Mean net profit growth	10.57* (4.72)
Standard deviation of net profit growth	-11.42* (5.61)
Log (net cash flow)	-1.04 (0.69)
Log (working capital)	-1.89* (0.88)
Risk	
Risk rating	-2.93* (1.29)
Collateral	
Collateral (deposits)	7.19 (5.92)
Collateral (business assets)	3.74 (6.93)
Firm characteristics included	
Years in business	Yes
SIC dummies	Yes
State dummies	Yes
Adjusted R-squared	0.37
Number of observations	637

*Denotes statistical significance at a 95% confidence level.

**Denotes statistical significance at a 99% confidence level.

Notes: This table reports the results of an OLS regression of credit line usage (a two-year average of the percentage of the credit line used) on measures of price, net funding needs, risk, collateral, age, and firm characteristics (not reported). Heteroskedasticity-robust standard errors are in parentheses. The price measures consist of commitment fees (log thousands of dollars), overcharge fee spread, interest rate, and risk premium spread (all in percentage points). Net funding needs are represented by the mean and standard deviation of net profit growth (percent growth), net cash flow, and working capital (both log thousands of dollars). Risk rating is measured on a scale of 1–8, where 8 represents the highest risk. Collateral is measured by a dummy variable for each type. All percentage and growth rate figures are expressed as decimals. SIC indicates standard industrial classification.

Source: Authors' calculations based on panel data set from a large bank.

frequently. Overcharge fees have a small but statistically significant effect on usage. Increases in interest rates and risk premium spreads lead to lower utilization rates, but the effects are much smaller than those for credit line size.

The average and standard deviation of net profit growth affect utilization as expected—the former

increasing it (by 10 percent for each 1 percentage point increase); the latter decreasing it (by 11 percent for each 1 percentage point increase). Cash flow and working capital have negligible effects on usage, possibly because, conditional on having obtained the line, it is less costly for firms to use external funds (which must be paid for whether they are used or not) than internal funds.

Riskier firms use smaller amounts of their credit lines; each one-step increase in risk category decreases line usage by about 3 percent. This may be consistent with the hypothesis that riskier firms are reluctant to use their credit for fear that credit will become more costly or unavailable if their condition deteriorates further.

Collateral has a large but statistically insignificant effect on usage. There is no economically or statistically significant variation in utilization by age of the firm, industrial classification, or state location.

Conclusion

Firms borrow in order to undertake investment or to insulate themselves from macroeconomic shocks, among other reasons. Thus, a better understanding of firm borrowing not only allows us to better model individual firm behavior, but also may enhance our ability to understand business cycles. Credit lines are an important source of borrowing, especially for small firms. There are several competing explanations for the existence and use of credit lines: hedging against deterioration in creditworthiness, hedging against aggregate reduction in credit, solving informational problems that make it hard for firms to borrow in other markets, or providing speed and flexibility to enable firms to take advantage of investment opportunities. Although a number of researchers have looked at the determinants of the supply of credit lines, few have looked at demand; those that have looked at demand have analyzed publicly traded firms, for which data are more readily available.

In this article, we look at the demand for credit lines by privately held firms. Our findings are consistent with predictions derivable from several models of credit line usage. Firms facing higher upfront commitment fees, risk premium spreads, or usage fees have smaller credit lines, while those with higher overdraft fees have larger ones. Firms with greater profit growth in the past have larger credit lines, while those with more internal funds or higher volatility in profit growth have smaller credit lines. The results for line utilization are quite similar. We also find that firms rarely exhaust their credit lines; rather, they convert the unused portions of their credit lines to spot loans and take out new lines. This last finding suggests there is a dynamic interaction between line size and usage; it would be of

interest to model this relationship in order to develop new predictions and to link the estimates of firm borrowing behavior more directly to models of economic fluctuations. Finally, although we have tried to separate

the determinants of demand from those of supply, we have likely not done so perfectly. Thus, some of the effects we identify may also reflect factors that affect loan supply.

NOTES

¹For further discussion of banks' roles in solving information problems in small business lending, see Berger and Udell (1998) and Petersen and Rajan (1994, 1995).

²See, for example, Bernanke and Blinder (1992); Gertler and Gilchrist (1992); and Kashyap, Stein, and Wilcox (1993).

³From the FFIEC's Reports of Condition and Income for commercial banks. Unused commitments on business credit lines are not measured directly; the cited figure is derived by taking total unused commitments and subtracting unused commitments on consumer credit lines.

⁴See, for example, Campbell (1978) and Hawkins (1982).

⁵See, for example, Blackwell and Santomero (1982); Melnik and Plaut (1986a); Sofianos, Wachtel, and Melnik (1990); Avery and Berger (1991); Berger and Udell (1992); and Morgan (1994).

⁶For further discussion of the behavior of bank lending during the financial crisis, see Evans (2008), Bernanke (2009), and Duke (2009, 2010).

⁷See Thakor and Udell (1987); Shockley and Thakor (1997); Boot, Thakor, and Udell (1987, 1991); Berkovitch and Greenbaum (1991); Duan and Yoon (1993); and Kanas (1987).

⁸See Berger and Udell (1992); Sofianos, Wachtel, and Melnik (1990); Morgan (1994); and Melnik and Plaut (1986b).

⁹Using other measures of firm growth, such as growth of total assets, total liabilities, and total sales in our regressions yielded results that were qualitatively similar.

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