

Corporate Diversification and Credit Constraints: Real Effects across the Business Cycle

Valentin Dimitrov
Rutgers University

Sheri Tice
Tulane University

We study whether differences in access to credit cause focused firms to perform differently from diversified firms in the product market. Prior work has identified binding credit constraints for bank-dependent firms during recessions. We assess whether corporate diversification alleviates these constraints. We find that during recessions sales growth rates drop more for bank-dependent focused firms than for rival segments of bank-dependent diversified firms. We also find that during recessions inventory growth rates drop more for bank-dependent focused firms than for bank-dependent diversified firms even after we control for contemporaneous sales growth. Consistent with a credit constraint explanation, we find no difference in the sensitivities to recessions of bank-independent focused and bank-independent diversified firms. (*JEL* G30, G31, G32)

Combining businesses under the control of a single parent firm may affect a firm's behavior in two ways. First, internal capital markets allow diversified firms to shift a given amount of scarce capital between divisions to finance some projects at the expense of others [Stein (1997)]. Second, combining imperfectly correlated divisions reduces diversified firms' cash flow volatility, resulting in lower bankruptcy risk and better access to credit [Lewellen (1971)]; Stein (2003) calls this the "more-money" effect of diversification. Most of the recent articles in the diversification literature examine the first effect. Lamont (1997), Shin and Stulz (1998), Rajan, Servaes, and Zingales (2000), Khanna and Tice (2001), and Billet and Mauer (2003) find evidence of active cross-subsidization within diversified firms. Similarly, Campello (2002) and Hubbard and Palia

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(1999) find evidence that internal capital markets alleviate the effect of external financial constraints on investment. In contrast, there is little evidence in the literature that the “more-money” effect influences firm behavior [Stein (2003)].

We complement the prior literature by examining whether the “more-money” effect of diversification alleviates credit constraints. Bernanke and Gertler (1995) and Bernanke, Gertler, and Gilchrist (1996) suggest that credit constraints are tighter during recessions than during nonrecession periods. Tighter credit constraints during recessions should limit the ability of firms to fund their investments. If focused (stand-alone) firms face tighter credit constraints, then we predict that their investment rates will drop more during recessions relative to the investment rates of their diversified rivals. We use two measures of investment: growth in sales and growth in inventory. Growth in sales reflects the effect of credit constraints on firm pricing, advertising, output, and investment strategies.¹ Growth in inventory reflects fluctuations in credit constraints, because adjustment costs are lower for inventory than for fixed assets or R&D [Hubbard (1998)]. According to our prediction, during recessions focused firms should experience a larger drop in both growth in sales and growth in inventory relative to their diversified rivals. Assuming recessions decrease the internal funds of all segments, a difference in sensitivities to recessions of focused and diversified firms should capture differences in access to credit rather than shifting of capital between divisions of diversified firms.

Testing whether diversification alleviates credit constraints is challenging because, in a rational expectations framework, firms will take into account all effects of diversification when choosing their organizational form. On the one hand, if diversification has no other costs and benefits, we would expect firms vulnerable to credit constraints to always be diversified to protect themselves against possible credit constraint risk. We think this equilibrium is unlikely, because diversification does entail other costs and benefits.² On the other hand, if diversification is costly, vulnerable firms may still diversify just ahead of a predictable tightening of credit constraints. Our empirical design helps us avoid this type of endogeneity. Because the timing and the duration of phases in the business cycle are difficult to predict, we expect that firms will not fully anticipate movements across the business cycle. Consequently, we do not expect firms to fully take into

¹ Maksimovic and Phillips (2002) also examine growth in sales of focused and diversified firms during recession and nonrecession periods. However, they examine whether resource allocation across divisions of diversified firms is efficient when there are shocks to demand rather than whether diversification alleviates credit constraints.

² For example, Rajan, Servaes, and Zingales (2000) and Scharfstein and Stein (2000) point out that diversification creates costly agency problems.

account an upcoming recession when they choose their organizational form.³

Another endogeneity issue related to our prediction is that differences between focused and diversified firms may be driven by unobservables correlated with organizational form rather than by differences in access to credit caused by organizational form. We use an instrumental variables (IV) procedure to control for endogeneity due to unobservables. We also contrast bank-dependent (constrained) and bank-independent (unconstrained) subsamples to ensure that differences in access to credit drive the observed differences in real business activity. We expect differences in the sensitivities of growth rates to recessions of focused and diversified firms to be apparent only within the bank-dependent subsample, because bank-independent firms are unlikely to be constrained regardless of their organizational form. Our empirical design is most similar to the one used in Campello (2003). He uses intertemporal and cross-sectional contrasts to evaluate the effect of another firm characteristic (capital structure) on firm performance.⁴

We find that during recessions bank-dependent focused firms experience a net loss of 7.4% in industry-adjusted growth in sales versus their bank-dependent diversified competitors. While the average industry-adjusted growth in sales of bank-dependent focused firms drops by 4.5% during recessions, that of segments of bank-dependent diversified firms increases by 2.9%. Our results are robust to including firm and segment fixed effects and lagged sales growth as explanatory variables. They are also robust to using an instrumental variables procedure to address the concern that there may be an endogenous link between focus and the sensitivity of sales growth to recessions. At the firm level, we document that during recessions the growth in inventory of manufacturers falls more for bank-dependent focused firms even after we control for contemporaneous growth in sales. We find no significant differences in the behavior of bank-independent diversified and focused firms in any of our tests.

Our study contributes to the diversification literature by documenting a relationship between diversification, access to credit, and real business activity. Our results show that diversification affects real business activity when credit constraints tighten. Unlike other articles that examine internal capital markets, we find that diversification impacts firm behavior by improving access to credit for the firm as a whole.

³ A similar argument can be made concerning lenders, who are unlikely to fully take into account an upcoming recession when making loans to firms.

⁴ A partial list of other articles that use intertemporal and cross-sectional contrasts are Kashyap and Stein (2000), Campello and Fluck (2003), Almeida, Campello, and Weisbach (2004), and Khanna and Tice (2005).

We organize the rest of the article as follows. In Section 1 we provide an overview of theoretical arguments of how credit constraints vary across the business cycle for focused and diversified firms. In Section 2 we describe the data and present summary statistics for our sample. In Section 3 we report segment-level investment tests. In Section 4 we report firm-level investment tests. We present our concluding remarks in Section 5.

1. Diversification and the Business Cycle: Theoretical Predictions

In this section we discuss the theoretical motivation behind our empirical design. We expect focused firms' investment rates to drop more during recessions relative to the rates of their diversified rivals for two reasons. First, focused firms are likely to face a larger increase in their external finance premiums than diversified firms when firm net worth (the sum of liquid assets and marketable collateral) drops during recessions. Second, focused firms are more likely to become credit rationed than diversified firms when there is a contraction in bank reserves at the onset of recessions. The greater cash flow volatility and the resulting lower credit quality of focused firms drive both effects.

Bernanke and Gertler (1989) predict that external financing premiums will rise more for firms with marginal credit quality (focused firms) as the economy moves from nonrecession periods to recessions. During nonrecession periods borrower net worth is high, and firms are likely to be well collateralized. Although idiosyncratic shocks will be larger for focused firms, well-collateralized firms are able to repay their loans even if a bad idiosyncratic shock occurs. In this case, asymmetric information costs between firms and lenders are small, and both focused and diversified firms have a small external finance premium (the difference between the cost of external and internal funds due to asymmetric information). During recessions, firm cash flows and collateral values decrease due to a lower demand for company products. The drop in borrower net worth increases the probability of default. Consequently, the external finance premium rises due to lenders' higher expected evaluation, monitoring, and collection costs. As borrower net worth drops, the probability of default and the external finance premium should increase more for focused firms due to their greater cash flow volatility. The larger increase in the external finance premium faced by focused firms during recessions should lead to a larger drop in investment.

Because of their lower credit quality, focused firms are also more likely to become credit rationed during recessions relative to their diversified rivals. Stiglitz and Weiss (1981) show that, in equilibrium, banks may deny credit to firms with low credit quality rather than charge them higher interest rates. The reluctance of banks to increase rates stems from the adverse effect higher interest rates have on the quality mix and

incentives of potential borrowers. We expect less credit rationing during nonrecession periods when there are ample bank reserves. In contrast, we expect credit rationing to increase at the onset of recessions because of tighter monetary policy. In particular, if banks cannot cheaply replace the Fed-induced shortfall in insured deposits at the start of recessions, a contraction in bank reserves is likely to reduce the supply of bank loans. As discussed in Jaffe and Stiglitz (1990), holding all else fixed, a reduction in the supply of bank loans will lead to more credit rationing of borrowers with marginal credit quality (focused firms) before impacting firms with higher credit quality (diversified firms). More credit rationing of focused firms during recessions should also lead to a larger drop in their investment.

Both the net worth model and the credit rationing model predict that the difference in access to credit between focused and diversified firms will widen during recessions. We use these predictions to examine whether focused firms exhibit more cyclical behavior in their real business activities.

2. Sample and Data

2.1 Sample Construction and Variable Definitions

We collect data for our tests from several sources. We collect segment data from the 1996 Compustat annual business segment files that cover the period 1978–1996. For fiscal years ending after December 15, 1977, FASB No.14 and SEC Regulation S-K require firms to report financial data for business segments that are “significant” to the firm as a whole. A business segment is “significant” if revenues, assets, or profits exceed 10% of consolidated firm totals. Firms are also required to consider interperiod comparability. For instance, a business segment that has been significant in the past, and is expected to be significant in the future, is a reportable segment even if it fails to satisfy the 10% rule in the current year. For each reportable business segment Compustat reports segment assets, sales, operating income before depreciation, and capital expenditures, along with the primary SIC code of the segment. In 2000, the FASB SFAS 131 ruling changed the requirements for segment reporting. Compustat is in the process of restating historic segment data to reflect the new FASB ruling; the restated data only go back to 1985 at this time. Since two recessions occurred in the early 1980s, we use the original 1996 Compustat segment data file for our tests. We collect data on company-wide variables from the Compustat annual industrial, full coverage, and research files.

The central variable in our tests is a focus dummy, which equals one if a firm is focused and zero if it is not. We classify a company as focused if it has only one reportable business segment for the prior fiscal year. If the company has more than one reportable business segment we classify it as

diversified.⁵ Lewellen (1971) argues that even a modest degree of diversification generates the bulk of bankruptcy risk reduction. The FASB rule that a reportable segment must be a “significant” portion of the firm’s operations suggests a nontrivial level of diversification for firms with multiple reportable segments. In support of our measure of diversification, we later show that diversified firms in our sample have significantly lower variability in operating cash flows.

Compustat segment data are noisy. Firms allocate (perhaps arbitrarily) overhead costs and assets between segments, making comparisons between segments of different firms problematic [Lamont (1997)]. Although guidelines exist to help firms identify reportable segments, Denis, Denis, and Sarin (1997) document that some introductions and removals of segments cannot be linked to diversification or refocusing announcements. We address these segment data problems by replicating our segment-level tests at the firm level.

We gather business cycle data from the National Bureau of Economic Research (NBER) *Business Cycle Expansions and Contractions*. Real gross domestic product data, federal funds rate data, and inventories data are from the Federal Reserve Bank of St. Louis, FRED[®]. During the 1978–1996 period of our study there are three NBER recessions: (1) January 1980–July 1980; (2) July 1981–November 1982; and (3) July 1990–March 1991. Business conditions worsen substantially during the NBER recessions in our study. We plot the quarterly changes in real gross domestic product (GDP) over the sample period in Figure 1, and the monthly federal funds rate, an indicator of monetary policy, in Figure 2. While all three recessions correspond to large drops in GDP growth, the first two are more severe. The onset of the first two recessions also coincides with tight monetary policy.

We use two-year nonoverlapping periods in our tests. We classify the periods of 1979–1980, 1981–1982, and 1990–1991 as recessions and the periods of 1983–1984, 1986–1987, 1988–1989, 1992–1993, and 1994–1995 as nonrecession periods.⁶ Our classification ensures that the beginning of each two-year recession period (our reference point for growth in sales and growth in inventory) does not fall within a NBER recession period regardless of a firm’s fiscal year-end. In addition, by using two-year periods we treat a recession that overlaps two calendar years as a single event instead of two independent yearly events. One drawback of our

⁵ As a robustness check, we eliminate all firms reporting multiple segments whose largest segment accounts for more than 90% of conglomerate firm sales (approximately 3% of sample). The results reported in the article remain unchanged.

⁶ There are an odd number of years between 1982 and 1990, so one year needs to be omitted. We avoid omitting a year during the two-year periods preceding or following recessions, as cyclical movements may be most evident at these times. The results we report omit 1985. Similar results are generated if we omit 1987 instead.

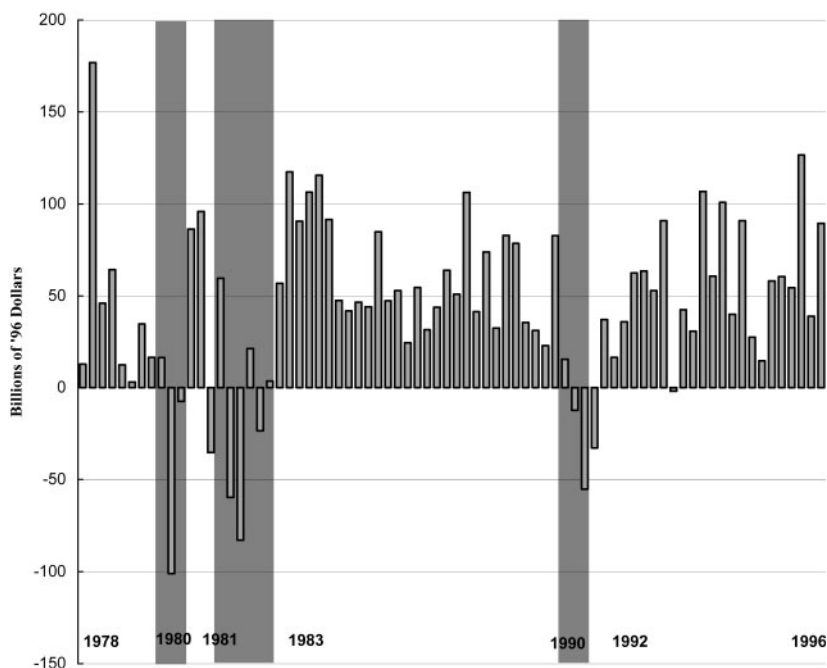


Figure 1
Quarterly change in real GDP

The graph displays the quarterly change in real gross domestic product (billions of chained 1996 dollars, seasonally adjusted annual rate) from 1978:1 to 1996:4. The three NBER recessions during the sample period are indicated by the tall, shaded bars on the graph. Business cycle data are from the National Bureau of Economic Research (NBER) *Business Cycle Expansions and Contractions*. Real gross domestic product data are from the Federal Reserve Bank of St. Louis, FRED®.

approach is that, depending on firms' fiscal year-end, some recession observations either fail to include the final months of a recession or include some nonrecession months. Such limitations reduce the power of our tests to capture differences between recessions and nonrecession periods.

We construct our initial sample by including segments and parent firms with nonmissing sales at both the beginning and the end of a two-year observation period. The restriction is necessary to calculate segment and firm growth rates and results in an initial sample of 40,455 segment-period observations. We do not include segments of firms with at least one segment in SIC codes between 6000 and 6999 (Financial Service Industry) or between 4900 and 4941 (Regulated Utilities). Like Berger and Ofek (1995) and Shin and Stulz (1998), we eliminate segments of firms where the sum of segment sales differs from total firm sales by more than 1% (3,616 segment-period observations). We also eliminate segments with beginning sales of less than or equal to \$20 million (in 2001 dollars)

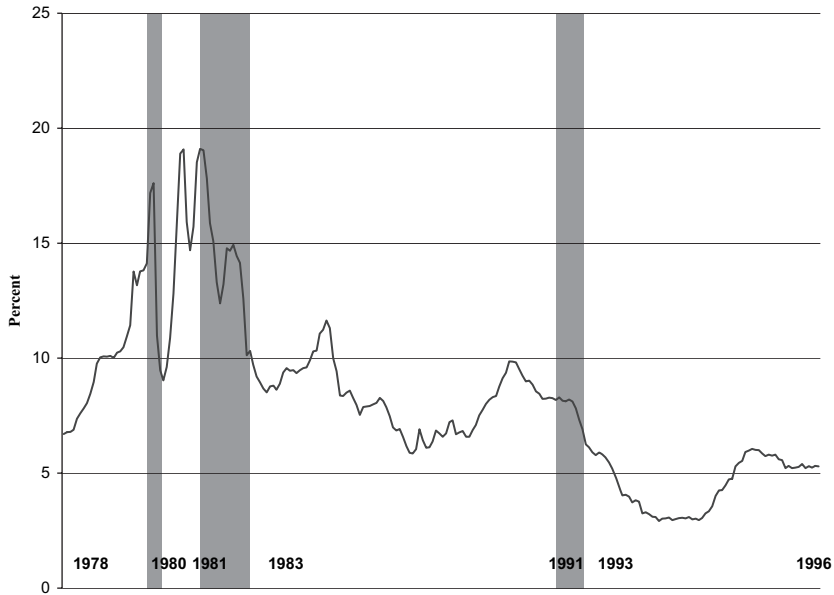


Figure 2
Monthly federal funds rate

The graph displays the monthly federal funds rate from 1978:1 to 1996:4. The three NBER recessions during the sample period are indicated by the tall, shaded bars on the graph. Business cycle data are from the National Bureau of Economic Research (NBER) *Business Cycle Expansions and Contractions*. Federal funds rate data are from the Federal Reserve Bank of St. Louis, FRED®.

because the growth rates of such small segments are often extreme (9,325 segment-period observations).⁷

To calculate our control variables, we require that segments have data on operating income, assets, and capital expenditures, and that parent firms have data on assets, operating income before depreciation, and capital expenditures, for the fiscal year preceding the two-year observation period. We exclude firms if their cash holdings or their total debt for the prior fiscal year is less than 0% or more than 100% of total assets. These additional restrictions further reduce the sample by 1,368 segment-period observations.

To capture differences between focused firms and their diversified rivals, we only include segments from industries with at least one focused firm and at least one segment of a diversified firm over the observation period.⁸ To make industry-adjusted numbers meaningful, we exclude industries that do not have at least three segments in existence over the

⁷ We examine a lower cutoff of \$10 million for segment sales. The lower cutoff increases the final sample by 3,105 segment-period observations but does not alter our results.

⁸ The restriction uses a potentially endogenous variable (focus). As we discuss later, our results are robust to including industries with only focused firms or only segments of diversified firms.

observation period. These final two restrictions reduce the sample by 5,604 segment-period observations, leaving us with a final sample of 20,542 segment-period observations. We allow individual segments to drop out and reenter the sample depending on data availability.

We separate firms into two subsamples: bank-dependent and bank-independent. We classify firms as bank-dependent if they have neither a bond rating nor a commercial paper rating. We classify firms as bank-independent if they have a bond rating or a commercial paper rating. We use Standard & Poor's (S&P) bond ratings and Moody's commercial paper ratings. S&P bond ratings are available on Compustat starting in 1985. Prior to 1985, we collect bond ratings from S&P Bond Guides. We collect commercial paper ratings from Moody's Bond Record. Firms whose bonds are rated only by Moody's or whose commercial paper is rated only by S&P are misclassified as bank-dependent. However, Odders-White and Ready (2006) find that 98% of NYSE listed firms with Moody's bond ratings in 1998 also had S&P bond ratings. Similarly, Faulkender and Petersen (2006) consult with rating agencies and conclude that the magnitude of misclassifications from using only one source of ratings is small.

The occasional reorganization of segments can alter their growth rate, profitability, and investment. Despite the exclusion of the smallest segments from the data, the values of some variables remain large. As in Shin and Stulz (1998), we winsorize segment and firm growth in sales, growth in firm inventory, segment and firm capital expenditures divided by assets, and segment and firm operating income divided by sales. Our approach ensures that outliers caused by segment reorganization do not affect our conclusions. In the reported tests we winsorize values at the 1st and 99th percentiles. Our results are not substantially different when we do not winsorize values or when we winsorize values at the 0.5th and 99.5th percentiles.

We define industries by segment four-digit primary SIC codes, which are the most specific industry definitions available in our dataset.⁹ We industry adjust segment-level variables by taking the deviation from industry medians. We calculate median industry values using both focused firms and segments of diversified firms that operate in the same four-digit SIC code industry. We do not industry adjust firm-level variables because diversified firms operate in multiple industries. Table 1 contains detailed definitions of the variables in our tests.

2.2 Sample Summary Statistics

Table 2 reports summary statistics dividing the full sample of business segment observations into focused firms and segments of diversified

⁹ Clarke (1989) shows that firms with the same four-digit SIC codes do not behave similarly with respect to sales, profit, and stock price changes. However, he states that his study is biased against finding similarities because he aggregates financial results over the multiple SIC code divisions of diversified firms. We use segment four-digit SIC codes for our tests.

Table 1
Variable definitions and data sources

Variable	Definition
Industry-adjusted segment sales growth	Segment growth in sales over the two-year observation period. We industry adjust segment sales growth by subtracting the median industry growth in sales from the growth in sales of the segment. Data are from Compustat Segment files.
Lagged industry-adjusted segment sales growth	Segment growth in sales over the year preceding the two-year observation period. We industry adjust lagged segment sales growth by subtracting the median industry lagged growth in sales from the lagged growth in sales of the segment. Data are from Compustat Segment files.
Industry-adjusted segment OPM	Segment operating income before depreciation divided by segment sales. We industry adjust segment OPM by subtracting the median industry segment OPM from the OPM of the segment. Measured for the year preceding the two-year observation period. Data are from Compustat Segment files.
Industry-adjusted segment CAPX/assets	Segment capital expenditures divided by segment assets. We industry adjust segment CAPX/Assets by subtracting the median industry segment CAPX/Assets from the CAPX/Assets of the segment. Measured for the year preceding the two-year observation period. Data are from Compustat Segment files.
Segment sales (2001 \$)	Segment sales*2001 CPI Deflator. Measured for the year preceding the two-year observation period. Data are from Compustat Segment files.
Segment assets (2001 \$)	Segment assets*2001 CPI Deflator. Measured for the year preceding the two-year observation period. Data are from Compustat Segment files.
Firm debt/assets	The sum of short-term debt and long-term debt divided by total firm assets. Compustat ((Item 34+Item 9)/Item 6). Measured for the year preceding the two-year observation period.
Firm cash/assets	Cash and marketable securities divided by total firm assets. Compustat (Item 1/Item 6). Measured for the year preceding the two-year observation period.
Firm inventory growth	Growth in inventory over the two-year observation period. Inventory is measured as Compustat Item 3.
Firm sales growth	Firm growth in sales over the two-year observation period. Sales are measured as Compustat Item 12.
Lagged firm sales growth	Firm growth in sales over the year preceding the two-year observation period. Sales are measured as Compustat Item 12.
Firm assets (2001 \$)	Firm assets. (Compustat Item 6)*2001 CPI Deflator. Measured for the year preceding the two-year observation period.
Firm sales (2001 \$)	Firm sales. (Compustat Item 12)*2001 CPI Deflator. Measured for the year preceding the two-year observation period.
Firm OPM	Firm operating income before extraordinary items divided by firm sales. Compustat (Item 13/Item 12). Measured for the year preceding the two-year observation period.
Firm CAPX/assets	Firm capital expenditures divided by firm assets. Compustat (Item 128/Item 6). Measured for the year preceding the two-year observation period.

firms, and into recessions and nonrecession periods. We report sales and assets in 2001 dollars and adjust the growth rates in sales and inventory for inflation. There are 10,741 segment-period observations for focused firms and 9,801 segment-period observations for diversified firms. Focused firms in our sample are larger than the corresponding segments

Table 2
Sample summary statistics

Variable	Focused Firms		Diversified Firms	
	Nonrecession periods	Recessions	Nonrecession periods	Recessions
Industry-adjusted segment sales growth	0.1061	0.0521***	0.0270	0.0399*
Industry-adjusted segment OPM	-0.0085	-0.0062	0.0036	0.0033
Industry-adjusted segment CAPX/assets	0.0113	0.0091*	0.0117	0.0121
Segment sales (2001 \$)	907.9	1,005.1	853.7	823.6
Segment assets (2001 \$)	926.0	933.6	695.2	584.6**
Firm debt/assets	0.2550	0.2769***	0.2728	0.2748
Firm cash/assets	0.1274	0.0979***	0.0846	0.0754***
Firm inventory growth	0.3047	0.0594***	0.1092	-0.0099***
Firm sales growth	0.2785	0.0609***	0.1118	-0.0080***
Firm assets (2001 \$)	926.0	933.6	1,942.8	1,833.1
Firm sales (2001 \$)	907.9	1,005.1	2,150.2	2,300.5
Percentage of firms with bond and/or commercial paper ratings	14.4%	13.0%*	34.1%	27.6%***
Number of segments	7,169	3,572	5,161	4,640
Average number of segments per period	1,434	1,191	1,032	1,547
Number of firms	7,169	3,572	3,003	2,476
Average number of firms per period	1,434	1,191	601	825

The table shows the arithmetic means of variables conditional on firm organizational structure and macroeconomic conditions. The sample covers eight nonoverlapping two-year periods. The periods 1979–1980, 1981–1982, and 1990–1991 are classified as recessions, while the periods 1983–1984, 1986–1987, 1988–1989, 1992–1993, and 1994–1995 are classified as nonrecession periods using NBER business cycle data. Focused firms are firms reporting a single business segment for the fiscal year preceding a given two-year observation period, while diversified firms are firms reporting at least two business segments. Bond ratings are collected from *Standard & Poor's* Bond Guides prior to 1985 and from Compustat from 1985 on. Commercial paper ratings are collected from *Moody's* Bond Record. See Table 1 for detailed definitions of the other variables. Asterisks (***, **, *) denote a statistically significant difference from nonrecession periods at the 1%, 5%, or 10% level, respectively, using a *t*-test.

of diversified firms. In addition, focused firms have higher average cash-to-assets ratios than diversified firms and are less likely to have a bond rating. The average industry-adjusted growth in sales for focused firms is cyclical; it is 5.4% lower during recessions. In contrast, the average industry-adjusted growth in sales of segments of diversified firms is 1.3% higher during recessions than during nonrecession periods.¹⁰

The average number of segments of diversified firms in our sample is higher during recessions than during nonrecession periods, while the opposite is true for focused firms. In Table 3 we show the fraction of segments from diversified firms for each two-year observation period.

¹⁰ The mean industry-adjusted growth rates for both focused firms and segments of diversified firms are positive values because of positive skewness in industry-adjusted growth in sales around the median.

Table 3
Diversification trend

Period	Period classification	Total number of segments	Segments of diversified firms as a fraction of all segments
1979–1980	recession	3426	0.6457
1981–1982	recession	2285	0.6223
1983–1984	nonrecession	2045	0.5883
1986–1987	nonrecession	2505	0.4303
1988–1989	nonrecession	2384	0.3930
1990–1991	recession	2501	0.4022
1992–1993	nonrecession	2607	0.3759
1994–1995	nonrecession	2789	0.3453

The table shows the fraction of segments belonging to diversified firms for each two-year observation period. The periods 1979–1980, 1981–1982, and 1990–1991 are classified as recessions, while the periods 1983–1984, 1986–1987, 1988–1989, 1992–1993, and 1994–1995 are classified as nonrecession periods using NBER business cycle data. Focused firms are firms reporting a single business segment for the fiscal year preceding a given two-year observation period, while diversified firms are firms reporting at least two business segments.

Similar to Comment and Jarrell (1995), we find that the fraction of segments from diversified firms decreases steadily over the sample period. Two of the three recessions in our study occurred in the early 1980s, when a higher proportion of firms were diversified. The corporate refocusing trend over the sample period, along with the timing of recessions, results in a lower number of focused firms during recessions than during nonrecession periods. It also results in a higher number of diversified firms during recessions than during nonrecession periods. We control for this regularity in the data by including a time trend variable in the regressions that follow. The variable is defined as the distance, in years, of the observation period from 1979. Our results are similar whether or not we include the time trend variable.

In Table 4 we examine whether the diversified firms in our sample have lower variability in operating cash flows. We measure the standard deviation of quarterly firm-level operating cash flows (Compustat quarterly data item 21, measured in 2001 dollars) within each nonoverlapping two-year period to capture cash flow variability unrelated to the business cycle. We have sufficient quarterly data for 12,640 of our sample firms. We regress the standard deviation of quarterly cash flows on firm size and the firm focus dummy. We also include firm-level four-digit SIC code fixed effects in the regression to control for seasonal trends. Consistent with the predictions of Lewellen (1971), we find that diversified firms have significantly lower variability in operating cash flows.¹¹

¹¹ We later separate our sample into bank-dependent and bank-independent subsamples. Diversified firms have lower variability in operating cash flows within both subsamples.

Table 4
Variability in firm operating cash flow

Variable	
Constant	−46.910*** (1.333)
Log of firm sales (2001 \$)	10.153*** (0.235)
Focus dummy	2.157*** (0.440)
Firm-level industry fixed effects	Included
Adjusted R ²	0.50
Number of observations	12,640

The dependent variable is the standard deviation of firm-level quarterly operating cash flow (Compustat quarterly data item #21, measured in 2001 dollars) over each nonoverlapping two-year observation period. Independent variables are measured at the beginning of the two-year observation period and include firm size, a focus dummy, and firm-level four-digit SIC code fixed effects. Focused firms are firms reporting a single business segment for the fiscal year preceding a given two-year observation period, while diversified firms are firms reporting at least two business segments. Values in parentheses are standard errors. Standard errors are corrected for heteroscedasticity using the Huber-White robust estimator. The superscript (***) denotes coefficients significantly different from zero at the 1% level.

3. Business Segment-Level Tests

In this section we present our segment-level tests. Segment-level data allow us to compare focused firms and segments of diversified firms in relatively narrow product markets by using industry-adjusted growth in sales at the four-digit SIC code level. We use narrow industry definitions to address concerns that focused firms may operate in more cyclical industries. We expect focused firms and segments of diversified firms within the same narrow product market to face similar demand. Absent differences in credit constraints, the drop in demand during recessions should affect focused and diversified firms equally. In contrast, we expect the real business activities of focused firms to be more adversely affected by recessions if focused firms face tighter credit constraints than their diversified rivals.

Despite facing similar demand, focused and diversified firms may have different levels of growth in equilibrium. During nonrecession periods focused firms may grow faster or slower than diversified firms. By examining differences in behavior across the business cycle, we avoid concerns regarding endogenous levels of growth for focused and diversified firms. Irrespective of the level of growth during nonrecession periods, we predict a larger drop in the growth rates of focused firms during recessions. For example, if focused firms grow faster on average during nonrecession periods, during recessions they may grow at a rate closer to or even lower than the growth rate of diversified firms.

We contrast bank-dependent and bank-independent subsamples to ensure that differences in access to credit drive the observed differences in real business activity of diversified and focused firms. Bank-dependent firms are more likely to face credit constraints in recessions because they

lack access to the bond market and the commercial paper market, and have lower firm net worth and higher firm-specific cash flow variability. In support, Gertler and Gilchrist (1994) find that sales growth, inventory growth, and debt growth rates for small manufacturers (which tend to be bank-dependent) are more sensitive to recessions than those of large manufacturers.¹² Similarly, Kashyap, Lamont, and Stein (1994) find that inventories of bank-dependent firms drop more during recessions. We expect diversification to affect the cyclical behavior of bank-dependent firms but not of bank-independent firms, because bank-independent firms are unlikely to be constrained regardless of their organizational form. If we find that focused firms have more cyclical behavior in both the bank-dependent and bank-independent subsamples, we can attribute the result to factors other than differences in access to credit. However, if we find that focused firms have more cyclical behavior only in the bank-dependent subsample, we can attribute the result to binding credit constraints for focused firms.

3.1 Baseline Model

The baseline model we use is shown below.

$$\begin{aligned} \text{Industry-Adjusted Segment Sales Growth}_{i,t \text{ to } t+2} = & \alpha \\ & + \beta_1 \text{ Focus Dummy}_{i,t} + \beta_2 \text{ Recession Dummy}_{t \text{ to } t+2} \\ & + \beta_3 [\text{Recession Dummy}_{t \text{ to } t+2} \times \text{Focus Dummy}_{i,t}] + \beta_4 \text{ Firm Cash/Assets}_{i,t} \\ & + \beta_5 \text{ Firm Debt/Assets}_{i,t} + \beta_6 \log \text{ Firm Sales}_{i,t-1 \text{ to } t} \\ & + \beta_7 \text{ Industry-Adjusted Segment CAPX/Assets}_{i,t-1 \text{ to } t} \\ & + \beta_8 \text{ Industry-Adjusted Segment OPM}_{i,t-1 \text{ to } t} + \beta_9 \text{ Time Trend}_t + \varepsilon_{i,t}, \quad (1) \end{aligned}$$

where i represents the segment, and t represents the beginning of a nonoverlapping two-year observation period. The dependent variable is industry-adjusted growth in segment sales over the two-year observation period. Our primary interest is whether the coefficient on the interaction of the recession dummy with the focus dummy is statistically significant and economically meaningful. It represents the difference between the effect of recessions on focused firms and the effect of recessions on segments of diversified firms. If corporate diversification alleviates credit constraints, the coefficient on the interaction term should be negative and significant within the bank-dependent subsample.

We include industry-adjusted segment capital expenditures divided by assets (CAPX/Assets) and the log of firm sales as control variables.¹³ We expect

¹² More recently, Korajczyk and Levy (2003) examine debt financing patterns of financially constrained and unconstrained firms across the business cycle and document pro-cyclical debt ratios for financially constrained firms.

¹³ To avoid requiring an additional year of data, we measure capital spending by dividing capital expenditures during year $t-1$ by assets at the end of year $t-1$ rather than the beginning of year $t-1$.

segments with larger capital expenditures to experience larger subsequent growth in sales. We expect larger firms to grow more slowly. We also include three variables to capture borrowing capacity and internal funds: firm cash/assets, firm debt/assets, and industry-adjusted segment operating profit margin (OPM). We measure all control variables for the year preceding the two-year observation period. We define firm cash/assets as cash and marketable securities divided by total firm assets, firm debt/assets as the sum of short term debt plus long-term debt divided by total firm assets, and segment operating profit margin as segment operating income before depreciation divided by segment sales. We also include a time trend variable but do not report its estimated coefficient in this specification or in the ones that follow due to space considerations. We adjust standard errors for within firm-period error correlation and heteroscedasticity.

3.2 Estimates of Baseline Model

We report the estimates for Equation (1) as Model 1 in panel A of Table 5. For the bank-dependent subsample, we find that the industry-adjusted sales growth of focused firms drops more during recessions. The coefficient on the interaction of the recession dummy with the focus dummy is negative and significant at the 1% level. Focused firms experience a net loss of 7.4% in industry-adjusted sales growth versus segments of diversified firms during recessions. In particular, recessions lead to a drop in industry-adjusted growth in sales of 4.5% for focused firms and a rise in industry-adjusted growth in sales of 2.9% for segments of diversified firms. To the extent that we have controlled for differences in demand by using narrow industry definitions and industry-adjusted growth rates, the result is consistent with bank-dependent focused firms facing binding credit constraints during recessions.

The estimates of Equation (1) for the bank-independent subsample are presented in the second column of Model 1 in panel A of Table 5. We find no difference between the sensitivity to recessions of bank-independent focused firms and segments of bank-independent diversified firms. Assuming independence, the difference between the coefficients on the interaction of the recession dummy with the focus dummy in the two subsamples (Bank-Dependent–Bank-Independent) is -7.1% with a t -statistic of 2.85. Consistent with a credit constraints explanation, focused firms have more cyclical sales growth only within the bank-dependent subsample of firms.¹⁴

We perform a number of robustness tests. In Model 2 of Table 5 we control for the possibility that firms use their internal funds and

¹⁴ We reestimate Model 1 separately for the subsample of focused firms and the subsample of segments of diversified firms. We do not find a difference in the sensitivity to recessions between segments of bank-dependent and bank-independent diversified firms. However, we do find that during recessions the industry-adjusted growth rate in sales drops more for bank-dependent focused firms than for bank-independent focused firms. Thus, the difference in investment sensitivities across the bank-dependent and bank-independent subsamples is driven by focused firms.

Table 5
Industry-adjusted segment sales growth

Variable	Bank dependent	Bank independent	Bank dependent	Bank independent
	Model 1 base model		Model 2 expanded base model	
Panel A				
Intercept	0.060*** (0.020)	0.172*** (0.044)	0.054*** (0.021)	0.162*** (0.045)
Focus dummy	0.065*** (0.010)	0.007 (0.014)	0.065*** (0.010)	0.005 (0.014)
Recession dummy	0.029** (0.011)	0.00003 (0.015)	0.049*** (0.017)	0.030 (0.028)
Recession dummy*focus dummy	-0.074*** (0.013)	-0.003 (0.021)	-0.073*** (0.014)	-0.0008 (0.021)
Firm cash/assets	0.276*** (0.039)	0.194** (0.077)	0.305*** (0.049)	0.282*** (0.096)
Firm debt/assets	0.031 (0.021)	-0.008 (0.038)	0.046 (0.028)	-0.0001 (0.047)
Industry-adjusted segment OPM	0.287*** (0.055)	0.100 (0.083)	0.340*** (0.066)	0.073 (0.104)
Industry-adjusted segment CAPX/assets	0.979*** (0.073)	0.414*** (0.138)	0.984*** (0.074)	0.411*** (0.138)
Log of firm sales	-0.015*** (0.003)	-0.018*** (0.004)	-0.015*** (0.003)	-0.018*** (0.004)
Firm cash/assets* recession dummy			-0.100 (0.075)	-0.310** (0.147)
Firm debt/assets* recession dummy			-0.043 (0.041)	-0.032 (0.066)
Industry-adj. segment OPM* recession dummy			-0.165 (0.114)	0.084 (0.169)
R ²	0.0431	0.0137	0.0435	0.0148
Number of observations	15,509	5,033	15,509	5,033

Table 5
(continued)

	Bank dependent	Bank independent	Bank dependent	Bank independent	Bank dependent	Bank independent
Variable	Model 3: segment fixed effects		Model 4: firm fixed effects		Model 5: lagged growth included	
Panel B						
Intercept	2.101*** (0.099)	1.806*** (0.334)	1.816*** (0.085)	1.380*** (0.246)	0.008 (0.022)	0.149*** (0.044)
Focus dummy	-0.065** (0.026)	-0.094 (0.066)	-0.049** (0.022)	-0.054 (0.045)	0.047*** (0.010)	0.015 (0.013)
Recession dummy	0.066*** (0.013)	0.002 (0.017)	0.051*** (0.012)	0.005 (0.015)	0.019 (0.012)	-0.005 (0.013)
Recession dummy*focus dummy	-0.051*** (0.016)	0.011 (0.023)	-0.040*** (0.014)	0.008 (0.021)	-0.044*** (0.015)	0.012 (0.020)
Firm cash/assets	0.136* (0.071)	0.179 (0.162)	0.154** (0.062)	0.085 (0.125)	0.220*** (0.040)	0.197*** (0.076)
Firm debt/assets	-0.095** (0.046)	-0.140 (0.090)	-0.068* (0.041)	-0.119* (0.070)	-0.061*** (0.021)	-0.070** (0.033)
Industry-adjusted segment OPM	0.004 (0.085)	0.182 (0.162)	0.024 (0.076)	0.138 (0.110)	0.103* (0.057)	0.015 (0.089)
Industry-adjusted segment CAPX/assets	0.408*** (0.096)	-0.052 (0.211)	0.544*** (0.088)	0.365** (0.170)	0.675*** (0.076)	0.338*** (0.127)
Log of firm sales	-0.375*** (0.018)	-0.215*** (0.043)	-0.325*** (0.016)	-0.165*** (0.031)	-0.004 (0.003)	-0.017*** (0.005)
Lagged Industry-adj. segment sales growth					0.338*** (0.024)	0.275*** (0.039)
R ²	0.6519	0.6127	0.5575	0.3566	0.0961	0.0592
Adjusted R ²	0.3892	0.2969	0.3451	0.1570		
Number of observations	15,509	5,033	15,509	5,033	11,400	3,889

The dependent variable is industry-adjusted segment sales growth over the two-year observation period. The sample covers eight nonoverlapping two-year periods and consists of focused firms and segments of diversified firms. Focused firms are firms reporting a single business segment for the fiscal year preceding a given two-year period, while diversified firms are firms reporting at least two business segments. Specifications are conditional on whether a firm has a bond or commercial paper rating (bank-independent) or does not have a bond or commercial paper rating (bank-dependent). The periods 1979–1980, 1981–1982, and 1990–1991 are classified as recessions, while the periods 1983–1984, 1986–1987, 1988–1989, 1992–1993, and 1994–1995 are classified as nonrecession periods using NBER business cycle data. All model specifications contain a time trend variable (coefficient not shown) defined as the distance, in years, of the observation period from 1979. See Table 1 for detailed definitions of the other variables. The error structure in all model specifications is corrected for heteroscedasticity and within firm-period error correlation using the Huber-White robust estimator. Values in parentheses are standard errors. Panel A shows the estimates of the base model and the expanded base model. Panel B shows additional robustness tests. Asterisks (***, **, *) denote coefficients significantly different from zero at the 1%, 5% and 10% level, respectively.

borrowing capacity differently over recessions and nonrecession periods. We allow the coefficients on the three variables that capture borrowing capacity and internal funds to vary between recessions and nonrecession periods. The magnitude and significance level of the coefficient on the interaction of the recession dummy with the focus dummy remain similar to the results reported for Model 1.

In Model 3 and Model 4 of Table 5 we use fixed effects as additional controls for possible unobservables correlated with focus and the cyclicity of sales growth. We add segment fixed effects (Model 3 in panel B of Table 5) and firm fixed effects (Model 4 in panel B of Table 5) to our baseline model. The coefficients and significance levels are similar for Model 3 and Model 4. We use the estimates for Model 3 to discuss the marginal effects. For the bank-dependent subsample, the interaction of the recession dummy with the focus dummy is negative and statistically significant at the 1% level. During nonrecession periods, focused firms have an industry-adjusted growth in sales that is 6.5% lower than that of segments of diversified firms. During recessions, focused firms have an industry-adjusted growth in sales that is 11.6% lower than that of their diversified rivals. As the economy moves from nonrecession periods to recessions, focused firms experience a net loss of 5.1% ($11.6\% - 6.5\%$) in industry-adjusted sales growth compared to segments of diversified firms.

We next control for the possibility that focused firms operate in higher growth niches within industries. If higher growth niches are more cyclical, focus may be correlated with cyclicity even in the absence of credit constraints. In Model 5 of Table 5 (panel B) we include lagged one-year industry-adjusted growth in segment sales. The test requires an additional year of data, and we lose 26% of the observations in the sample, including all observations from the recession period of 1979–1980. The *ceteris paribus* interpretation of the coefficients is that a recession leads to a rise in industry-adjusted growth in sales of 1.9% for segments of bank-dependent diversified firms and a drop in industry-adjusted growth in sales of 2.5% for bank-dependent focused firms. In other words, during recessions bank-dependent focused firms lose 4.4% ($2.5\% + 1.9\%$) in industry-adjusted sales growth compared to segments of bank-dependent diversified firms. We repeat the test by using lagged two-year industry-adjusted growth in segment sales but do not report the results in a table. Even though we lose 33% of all observations in the sample, we still find that during recessions bank-dependent focused firms lose 3.6% in industry-adjusted sales growth compared to segments of bank-dependent diversified firms.

Including lagged sales growth in Model 5 of Table 5 may result in biased and possibly inconsistent coefficient estimates. One solution is to use an instrumental variables estimator with first differences in sales growth. However, most of the segments in our sample do not have data on three consecutive periods of sales growth. As an alternative check we reestimate

the baseline model using firm market-to-book as a proxy for segment-level growth (not reported in a table). We find that focused firms experience a net loss of 4.7% in industry-adjusted sales growth compared to segments of diversified firms during recessions. The coefficient on the interaction variable remains significant at the 1% level. Our results also remain similar if we allow the coefficients on market-to-book and lagged industry-adjusted sales growth to vary between recessions and nonrecession periods.

In all models shown in Table 5 the coefficient on the interaction of the focus dummy with the recession dummy is negative and significant at the 1% level for the bank-dependent subsample but not significant for the bank-independent subsample. Assuming independence, the difference between the interaction coefficients across the two subsamples (Bank-Dependent–Bank-Independent) is statistically significant at the 5% level or better. The results suggest that the different product market behavior of focused firms reflects binding credit constraints rather than an endogenous relationship between focus and cyclical behavior.

3.3 Additional Robustness Tests

We perform several additional robustness checks. The results are not shown for these tests but are available from the authors by request. First, we test whether differences in firm size are driving our results. For the bank-dependent subsample there are 15,509 segment-period observations: 9,245 for focused firms and 6,264 for diversified firms. On average, focused firms in the bank-dependent subsample are smaller than diversified firms. We rank observations by firm sales (in 2001 dollars) and divide the bank-dependent subsample into three size groups. The coefficient on the interaction of the focus dummy with the recession dummy in Equation (1) is negative and significant at the 1% level for the small- and medium-size groups and negative and significant at the 5% level for the large-size group. It appears that focus, rather than firm size, is driving the observed cyclical sales growth.

We next employ the Heckman (1979) two-stage model to test whether requiring segments to remain in the sample during the respective two-year observation period biases our results. In the first stage, we estimate a probit model that predicts the probability of a segment's survival over a given two-year period. To improve the precision of our estimates, the probit model includes growth in industry sales as a variable [in addition to the variables in Equation (1)] that is correlated with the probability that a segment survives but not with industry-adjusted segment sales growth. We then use the inverse Mills ratio from the first stage probit as an additional explanatory variable in a second stage OLS estimation of industry-adjusted sales growth [Equation (1)] for surviving segments. We find that the coefficient on the interaction of the focus dummy with the recession dummy in the Heckman model is similar to the results shown in Table 5. The coefficient remains significant at the 1% level for

the subsample of bank-dependent firms and insignificant for the subsample of bank-independent firms.

The final robustness test in this section concerns our sample selection procedure. As discussed in Section 2.1, our sample only includes segments in four-digit SIC code industries with at least one focused firm and at least one segment of a diversified firm over a given observation period. The restriction amounts to filtering the data using a potentially endogenous variable. We estimate the model by dropping the restriction. We use raw rather than industry-adjusted values because within-industry comparisons between focused and diversified firms are not meaningful when industries consist of only focused firms or only segments of diversified firms. We include segment four-digit SIC code fixed effects to control for industry effects. The coefficient on the interaction of the recession dummy with the focus dummy remains similar to the baseline model. The coefficient remains significant at the 1% level for the bank-dependent subsample and remains insignificant for the bank-independent subsample.

3.4 Instrumental Variables Estimation

One important endogeneity concern in our model is that unobservables may be correlated with diversification and with the sensitivity of industry-adjusted sales growth to recessions. In this section we discuss an additional robustness test that uses an instrumental variables procedure designed to address endogeneity. We suppress the time subscripts and rewrite Equation (1) as

$$\begin{aligned} &\text{Industry - Adjusted Segment Sales Growth}_i \\ &= \beta X_i + \beta_{k+1} \text{Focus}_i + \beta_{k+2} \text{Focus}_i \text{Recession} + u_i, \end{aligned} \quad (2)$$

where X_i is a vector for segment i containing the following k variables: a constant, a recession dummy, firm cash/assets, firm debt/assets, industry-adjusted segment capital expenditures/assets, industry-adjusted segment operating profit margin, log of firm sales, and a time trend variable.¹⁵ The focus dummy " Focus_i " is a potentially endogenous binary explanatory variable. If Focus_i is endogenous, its interaction with the recession dummy " Recession " is also endogenous.

We search for instruments for the focus dummy that vary across segments in the same industry. The dependent variable in Equation (2) is measured relative to industry and is independent of characteristics that affect all segments in an industry in the same period in the same way. We identify instruments that are correlated with whether a segment is from a focused firm or a diversified firm, but that are not likely to be correlated

¹⁵ The results reported in Table 6 are robust to the inclusion of interactions of the recession dummy with the financial buffers of cash/assets, debt/assets, and operating profit margin.

with the sensitivity of industry-adjusted sales growth to recessions. We measure all instruments for the year preceding the two-year observation period.

Our first instrument for diversification is MI, a minority interest dummy which equals 1 if a segment's parent firm reports a nonzero amount for minority interest on its balance sheet (Compustat Item 38). Nonzero minority interest indicates that, at some point in time, the parent firm acquired a majority of the stock of another company. Since some acquisitions result in diversification, minority interest should be negatively correlated with the focus dummy. If unobservables vary over time, MI may not be correlated with contemporaneous segment-level unobservables. For example, a firm may have diversified several years ago when it had risk-averse managers or when it operated in a cyclical industry niche. Current management may be less risk averse, or the firm's product mix may have changed toward less cyclical products. In this case minority interest is less likely to be correlated with contemporaneous segment-level unobservables than with lagged segment-level unobservables.

We borrow our second and third instruments from Campa and Kedia (2002). The second instrument is PSDIV, the fraction of industry sales (excluding segment i) belonging to segments of diversified firms. PSDIV captures the overall attractiveness of an industry to conglomerates. PSDIV excludes the sales of segment i and is not likely to be correlated with unobservables that impact the sensitivity of segment i to recessions.

The third instrument, SNP, is a dummy which equals 1 if the segment belongs to a firm whose stock is a member of the S&P 500. Campa and Kedia (2002) argue that liquidity, proxied by SNP, affects the decision to diversify. Membership in the S&P 500 may not be correlated with unobservables that affect the sensitivity of industry-adjusted sales growth to recessions. According to Standard & Poor's, S&P 500 stocks are not necessarily the largest or most successful 500 stocks traded in the U.S. stock market. However, firms in the S&P 500 have better visibility, which may result in better access to credit. Because membership in the S&P 500 may be related to both diversification and access to credit, we estimate the instrumental variables model with and without the SNP instrument.

We use an instrumental variables estimator that exploits the binary nature of the endogenous explanatory variable and produces valid asymptotic inferences [Wooldridge (2001)]. In a preliminary stage, we create a generated instrument for the potentially endogenous variable $Focus_i$. The generated instrument $\hat{G}_i$ is the predicted probability that segment i is from a focused firm. It is estimated as a function of the exogenous variables contained in $\mathbf{X}_i$ as well as the instruments $\mathbf{Z}_i$. One feature that makes the procedure particularly robust is that the probit model does not have to be correctly specified, because $\hat{G}_i$ is an instrument for $Focus_i$. The estimated coefficients and standard errors for the

generated instrument probits are shown for the bank-dependent and bank-independent subsamples in the first two columns of Table 6.

We next use $\hat{G}_i$ as a generated instrumental variable for $Focus_i$, and $\hat{G}_{i,*}$ *Recession* as a generated instrumental variable for $Focus_{i,*}$ *Recession*. The reduced-form equations are

$$\begin{aligned} Focus_{i,t} = & \alpha_0 + \alpha_1 \text{ Firm Cash/Assets}_{i,t} + \alpha_2 \text{ Firm Debt/Assets}_{i,t} \\ & + \alpha_3 \text{ Industry-Adj. Segment OPM}_{i,t-1 \text{ to } t} \\ & + \alpha_4 \text{ Industry-Adj. Segment CAPX/Assets}_{i,t-1 \text{ to } t} \\ & + \alpha_5 \log \text{ Firm Sales}_{i,t-1 \text{ to } t} + \alpha_6 \text{ Recession Dummy}_{t \text{ to } t+2} \\ & + \alpha_7 \text{ Time Trend}_t + \delta_1 \hat{G}_{i,t} + \delta_2 \hat{G}_{i,t,*} \text{ Recession Dummy}_{t \text{ to } t+2} + v_{1i,t}, \end{aligned} \quad (3)$$

$$\begin{aligned} Focus_{i,t,*} \text{ Recession Dummy}_{t \text{ to } t+2} = & \alpha_0 + \alpha_1 \text{ Firm Cash/Assets}_{i,t} \\ & + \alpha_2 \text{ Firm Debt/Assets}_{i,t} + \alpha_3 \text{ Industry-Adj. Segment OPM}_{i,t-1 \text{ to } t} \\ & + \alpha_4 \text{ Industry-Adj. Segment CAPX/Assets}_{i,t-1 \text{ to } t} \\ & + \alpha_5 \log \text{ Firm Sales}_{i,t-1 \text{ to } t} + \alpha_6 \text{ Recession Dummy}_{t \text{ to } t+2} \\ & + \alpha_7 \text{ Time Trend}_t + \delta_1 \hat{G}_{i,t} + \delta_2 \hat{G}_{i,t,*} \text{ Recession Dummy}_{t \text{ to } t+2} + v_{2i,t} \end{aligned} \quad (4)$$

We estimate the F-statistic for an exclusion restriction that $\delta_1 = \delta_2 = 0$ for each equation. Our estimated instruments are correlated with the endogenous variables—a necessary requirement for instrumental variables. We reject the null hypothesis that δ_1 and δ_2 are jointly zero at the 1% level for both reduced-form equations, in both the bank-dependent and bank-independent subsamples.

We show the instrumental variables estimates and standard errors for Equation (2) in the last two columns of Table 6. The coefficient on the interaction of the focus dummy with the recession dummy remains negative and statistically significant at the 1% level for the subsample of bank-dependent firms. During nonrecession periods the industry-adjusted sales growth of bank-dependent focused firms is similar (1% higher) to that of diversified firms. During recessions the industry-adjusted sales growth of bank-dependent focused firms is 10.6% lower than that of segments of diversified firms. As the economy moves from nonrecession periods to recessions, focused firms experience a net loss of 11.6% in industry-adjusted sales growth compared to segments of diversified firms. The coefficient on the interaction of the focus dummy with the recession dummy remains insignificant for the subsample of firms that are bank-independent. For brevity we only report the results from using MI, PSDIV, and SNP together as instruments. The results are similar if we repeat our tests excluding SNP as an instrument, or if we use any one of the three instruments alone to create

Table 6
Industry-adjusted segment sales growth—instrumental variables

Variable	Bank dependent	Bank independent	Bank dependent	Bank independent
	Generated instrument estimation		IV estimates	
Intercept	2.120*** (0.071)	1.568*** (0.177)	0.125** (0.050)	0.172*** (0.043)
Focus dummy			0.010 (0.045)	0.004 (0.032)
Recession dummy*focus dummy			−0.116*** (0.033)	0.007 (0.044)
Recession dummy	−0.043 (0.027)	−0.024 (0.050)	0.052** (0.021)	−0.003 (0.017)
Firm cash/assets	1.035*** (0.110)	0.048 (0.254)	0.294*** (0.032)	0.195*** (0.062)
Firm debt/assets	0.029 (0.064)	0.373*** (0.131)	0.033* (0.020)	−0.007 (0.032)
Industry-adjusted segment OPM	−0.642*** (0.130)	−0.025 (0.243)	0.276*** (0.038)	0.100* (0.056)
Industry-adjusted segment CAPX/assets	−0.109 (0.176)	−0.592 (0.388)	0.975*** (0.054)	0.415*** (0.091)
Log of firm sales	−0.326*** (0.009)	−0.181*** (0.019)	−0.024*** (0.005)	−0.018*** (0.004)
PSDIV	−0.721*** (0.040)	−1.556*** (0.070)		
SNP	−0.224*** (0.057)	−0.350*** (0.052)		
MI	−0.300*** (0.033)	−0.573*** (0.054)		
Pseudo R ²	0.1684	0.2290		
Adj. R ²			0.0362	0.0119
Wald χ^2 (Ho: $\theta_{\text{Instruments}} = 0$)	439***	676***		
F-Statistic (Ho: OLS consistent)			3.02**	0.04
Number of observations	15,509	5,033	15,509	5,033

The first two columns display coefficients for a probit used to create $\hat{G}_i$, the generated instrument for the focus dummy. The dependent variable = 1 if the segment belongs to a firm reporting a single business segment for the fiscal year preceding a given two-year period, or 0 if the segment belongs to a firm reporting at least two business segments. Instruments used to generate the IV for the focus dummy are measured for the year preceding the two-year observation window and are MI = 1 if the segment belongs to a firm with nonzero minority interest and 0 otherwise; PSDIV = fraction of industry sales (excluding the segment in question) belonging to segments of diversified firms; SNP = 1 if the segment belongs to a firm in the S&P 500 and 0 otherwise. An IV estimation is employed using 1, $\hat{G}_i$, and all the exogenous variables in the system as instruments for the focus dummy and for the focus dummy interacted with the recession dummy. The IV estimated coefficients are shown in columns 3 & 4. The dependent variable in the IV estimation is industry-adjusted segment sales growth over the two-year observation period. The sample covers eight nonoverlapping two-year periods and consists of focused firms and segments of diversified firms. The periods 1979–1980, 1981–1982, and 1990–1991 are classified as recessions, while the periods 1983–1984, 1986–1987, 1988–1989, 1992–1993, and 1994–1995 are classified as nonrecession periods using NBER business cycle data. Specifications are conditional on whether a firm has a bond or commercial paper rating (bank-independent) or does not have a bond or commercial paper rating (bank-dependent). All specifications include a time trend variable (coefficient not shown) defined as the distance, in years, from 1979 of the observation period. Values in parentheses are standard errors. See Table 1 for detailed definitions of the other variables. Asterisks (***, **, *) denote coefficients significantly different from zero at the 1%, 5% and 10% level, respectively.

the generated instruments. We conclude that our main findings are robust to using an instrumental variables procedure to control for unobservables.

Our results in Section 3 are related to those of Opler and Titman (1994), Campello (2003), and Campello and Fluck (2003). Campello, and Campello and Fluck find that high debt relative to industry has a negative impact on industry-adjusted sales growth during recessions. Opler and Titman find that high debt has a negative impact on industry-adjusted sales growth during “distressed” industry periods. We find that firm focus, another variable related to financing, leads to a larger drop in industry-adjusted sales growth during recessions. In the next section we further examine the robustness of our results using firm-level data.

4. Firm-Level Sales and Inventory Growth

We supplement our evidence at the segment level by analyzing firm-level growth in sales and growth in inventory. We examine firm-level data for three reasons. First, our segment-level results exclude small segments, segments with missing data, and segments in industries with less than three segments. During recessions diversified firms may shift capital from smaller segments to larger ones or from industries with less than three segments to industries with three or more segments. Unlike segment-level tests, firm-level tests will reflect the growth rate of all segments of a diversified firm. Second, we use firm-level sales growth to address the concern that different companies may follow different procedures when allocating company-wide accounts to individual segments. Third, inventory data (available only at the firm level) can be used to relate differences in business activity between focused and diversified firms to differences in credit constraints. Differences in the sensitivity of inventory growth to recessions between focused and diversified firms are particularly difficult to attribute to differences in demand when we control for contemporaneous sales growth.

4.1 Firm-Level Sales Growth

We examine the sensitivity of firm sales growth to recessions by estimating a variation of Equation (1) using firm-level data. The equation we estimate is

$$\begin{aligned} \text{Firm Sales Growth}_{i,t \text{ to } t+2} = & \alpha + \beta_1 \text{Focus Dummy}_{i,t} \\ & + \beta_2 \text{Recession Dummy}_{t \text{ to } t+2} + \beta_3 [\text{Recession Dummy}_{t \text{ to } t+2} \times \text{Focus Dummy}_{i,t}] \\ & + \beta_4 \text{Firm Cash/Assets}_{i,t} + \beta_5 \text{Firm Debt/Assets}_{i,t} + \beta_6 \text{Firm OPM}_{i,t-1 \text{ to } t} \\ & + \beta_7 \text{Firm CAPX/Assets}_{i,t-1 \text{ to } t} + \beta_8 \text{Log Firm Sales}_{i,t-1 \text{ to } t} \\ & + \beta_9 \text{Time Trend}_t + \text{Industry Fixed Effects}_j + \varepsilon_{i,t}, \end{aligned} \quad (5)$$

where i represents the firm, j represents the 2-digit firm SIC code, and t represents the beginning of a nonoverlapping two-year observation period. Firm-level data do not allow us to industry adjust variables because diversified firms operate in more than one industry. Nevertheless, we control for industry effects by estimating Equation (5) as panel data with firm-level two-digit SIC code fixed effects. We adjust the standard errors for heteroscedasticity and within-industry-period correlation using the Huber-White robust estimator.

We report the estimates of Equation (5) as Model 1 in Table 7. Consistent with the results at the segment level, the coefficient on the interaction of the recession dummy with the focus dummy is negative and significant at less than 1% for the subsample of bank-dependent firms. During recessions bank-dependent focused firms experience a loss of 9.1% in firm sales growth relative to bank-dependent diversified firms. In particular, a recession leads to a drop in firm sales growth of 9.6% for diversified firms and 18.7% for focused firms. The interaction term is not significant for the subsample of bank-independent firms, suggesting that the results for bank-dependent firms are not driven by unobservables correlated with focus.

We show two other variations of Equation (5) in Table 7. Model 2 allows the three variables that capture borrowing capacity and internal funds to vary between recessions and nonrecession periods. Model 3 replaces industry fixed effects with firm fixed effects. The coefficient on the interaction of the recession dummy with the focus dummy is significant at the 1% level in both models for the bank-dependent subsample but not significant for the bank-independent subsample. Assuming independence, the difference in the coefficient across the two subsamples (Bank-Dependent–Bank-Independent) is statistically significant at better than the 5% level in both models.

As discussed in Section 2.1 and Section 3.3, our sample only includes segments (and their respective parent firms) in four-digit SIC code industries with at least one focused firm and at least one segment of a diversified firm over a given observation period. In Model 4 of Table 7 we test whether our inferences are robust to dropping this data restriction. The coefficient on the interaction of the recession dummy with the focus dummy remains negative and significant at the 1% level for the bank-dependent subsample and remains insignificant for the bank-independent subsample.

We next control for the possibility that focused firms have higher expected growth rates and that firms with higher expected growth rates are more cyclical. We include firm market-to-book as an additional independent variable and reestimate Equation 5 (results not tabulated). We find that during recessions bank-dependent focused firms experience a net loss of 5.6% in sales growth relative to bank-dependent diversified

Table 7
Firm sales growth

Variable	Bank dependent	Bank independent	Bank dependent	Bank independent	Bank dependent	Bank independent	Bank dependent	Bank independent
	Model 1: base		Model 2: expanded base		Model 3: firm fixed effects		Model 4: additional firms incl.	
Intercept	0.095*** (0.026)	0.228*** (0.063)	0.090*** (0.027)	0.215*** (0.065)	2.353*** (0.103)	2.614*** (0.405)	0.087*** (0.029)	0.216*** (0.064)
Focus dummy	0.107*** (0.013)	0.039* (0.020)	0.105*** (0.012)	0.035* (0.021)	0.030 (0.024)	0.051 (0.052)	0.116*** (0.013)	0.038** (0.019)
Recession dummy	-0.096*** (0.016)	-0.119*** (0.018)	-0.087*** (0.024)	-0.074** (0.034)	-0.057*** (0.015)	-0.089*** (0.019)	-0.096*** (0.021)	-0.116*** (0.019)
Recession dummy*focus dummy	-0.091*** (0.017)	0.002 (0.027)	-0.088*** (0.017)	0.009 (0.028)	-0.068*** (0.018)	-0.007 (0.025)	-0.095*** (0.019)	0.008 (0.027)
Firm cash/assets	0.412*** (0.047)	0.626*** (0.128)	0.453*** (0.058)	0.649*** (0.152)	0.090 (0.072)	0.201 (0.174)	0.427*** (0.047)	0.739*** (0.120)
Firm debt/assets	0.058** (0.026)	0.017 (0.047)	0.063* (0.033)	0.050 (0.058)	-0.121** (0.049)	-0.099 (0.083)	0.065*** (0.025)	0.022 (0.050)
Firm CAPX/assets	1.084*** (0.099)	0.542*** (0.172)	1.077*** (0.099)	0.541*** (0.170)	0.380*** (0.107)	0.233 (0.217)	1.087*** (0.104)	0.579*** (0.171)
Firm OPM	0.612*** (0.083)	0.096 (0.167)	0.559*** (0.090)	0.118 (0.190)	0.532*** (0.101)	0.587*** (0.160)	0.655*** (0.094)	0.137 (0.181)
Log of firm sales	-0.029*** (0.003)	-0.031*** (0.006)	-0.030*** (0.003)	-0.031*** (0.006)	-0.433*** (0.020)	-0.338*** (0.053)	-0.029*** (0.003)	-0.032*** (0.006)
Firm cash/assets* recession dummy			-0.158* (0.089)	-0.103 (0.225)				

Table 7
(continued)

	Bank dependent	Bank independent	Bank dependent	Bank independent	Bank dependent	Bank independent	Bank dependent	Bank independent
Variable	Model 1: base		Model 2: expanded base		Model 3: firm fixed effects		Model 4: additional firms incl.	
Firm debt/assets* recession dummy			-0.011 (0.054)	-0.111 (0.073)				
Firm OPM* recession dummy			0.224 (0.196)	-0.083 (0.298)				
Adjusted-R ²	0.1378	0.1062	0.1381	0.1061	0.4956	0.4712	0.1413	0.1351
Number of observations	13,016	3,204	13,016	3,204	13,016	3,204	14,007	3,443

The dependent variable is firm sales growth over the two-year observation period. Models 1, 2, and 4 include two-digit SIC code fixed effects (industry fixed effects) while Model 3 includes firm fixed effects. The sample for Model 4 includes firms with segments operating in industries with only focused firms or only diversified firms in addition to the firms in the original sample. The sample covers eight nonoverlapping two-year periods and consists of focused firms and diversified firms. Focused firms are firms reporting a single business segment for the fiscal year preceding a given two-year period, while diversified firms are firms reporting at least two business segments. The periods 1979–1980, 1981–1982, and 1990–1991 are classified as recessions, while the periods 1983–1984, 1986–1987, 1988–1989, 1992–1993, and 1994–1995 are classified as nonrecession periods using NBER business cycle data. Specifications are conditional on whether the firm has a bond or commercial paper rating (bank-independent) or does not have a bond or commercial paper rating (bank-dependent). All model specifications contain a time trend variable (coefficient not shown) defined as the distance, in years, of the observation period from 1979. See Table 1 for detailed definitions of the other variables. All estimations correct the error structure for heteroscedasticity and within industry-period error correlation using the Huber-White robust estimator. Values in parentheses are standard errors. Asterisks (**, **, *) denote coefficients significantly different from zero at the 1%, 5% and 10% level, respectively.

firms. The result is significant at the 1% level. The coefficient on the interaction of the recession dummy with the focus dummy remains insignificant for the bank-independent subsample.

In summary, we obtain similar results using both firm-level and segment-level data. Since the results hold at the firm level, the difference in the behavior of focused and diversified firms is difficult to explain with internal capital markets alone. In addition, the firm-level tests increase our confidence that the results in Section 3 are not driven by problems with Compustat segment data.

4.2 Firm-Level Inventory Growth

In addition to their effect on sales growth, we expect credit constraints to affect inventory growth. Kashyap, Lamont, and Stein (1994) and Gertler and Gilchrist (1994) show that during recessions credit-constrained manufacturers appear to be unable to finance inventories to smooth production. Blinder and Maccini (1991) show that during an average postwar recession the drop in inventory investment accounts for 87% of the drop in GNP. We plot the time series of the quarterly real change in inventories in Figure 3 and confirm that inventory growth is negative during the recessions in our study.

According to our prediction, we expect inventory growth to drop more during recessions for focused firms than for diversified firms. We also expect the inventory growth of focused firms to drop more during recessions even after we control for any contemporaneous drop in sales growth. The inclusion of sales growth allows us to explicitly control for differences in demand between focused and diversified firms.

We estimate Equation (5) using firm growth in inventory as the dependent variable. We include only manufacturing firms in our test because they contain the majority of inventories. In addition, the macroeconomic literature on inventories is based on the production-smoothing model which applies naturally to manufacturers. We define manufacturing firms as those with firm SIC codes beginning with a 2 or a 3. We require that firms in our sample have nonzero inventory levels at the beginning of the two-year observation period. We show the estimated coefficients for the base model as Model 1 in Table 8. During recessions the growth in inventory drops 12.2% more for bank-dependent focused firms than for bank-dependent diversified firms. In particular, during recessions the growth in inventory drops 14.4% for bank-dependent diversified firms and 26.6% for bank-dependent focused firms. Consistent with a credit constraint explanation, the interaction term is not significant for the subsample of bank-independent firms.

Three other model variations are shown in Table 8. Model 2 allows the three variables that capture borrowing capacity and internal funds to vary between recessions and nonrecession periods. Model 3 includes

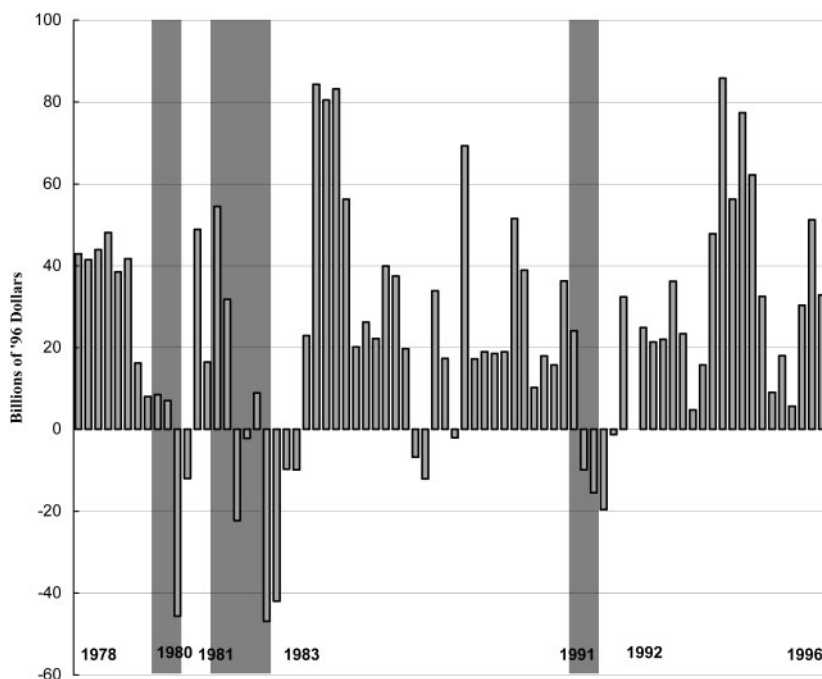


Figure 3

Quarterly real change in private inventories

The graph displays the quarterly real change in private inventories (billions of chained 1996 dollars, seasonally adjusted annual rate) from 1978:1 to 1996:4. The change in real private inventories is defined as the change in the physical volume of inventories owned by private business, valued in average prices of the period. The three NBER recessions during the sample period are indicated by the tall, shaded bars on the graph. Business cycle data are from the National Bureau of Economic Research (NBER) *Business Cycle Expansions and Contractions*. Inventories data are from the Federal Reserve Bank of St. Louis, FRED[®].

contemporaneous firm growth in sales. Model 4 replaces industry fixed effects with firm fixed effects. In all three alternative models, inventory growth drops significantly more for bank-dependent focused firms than for bank-dependent diversified firms during recessions. Model 3 is of particular interest, because in it we control for the influence of sales growth on inventory growth. In other words, we document a larger drop in the inventory growth of focused firms within the bank-dependent subsample (significant at the 5.0% level) even after we control for contemporaneous sales growth. The negative coefficient on the interaction variable in Model 3 is particularly difficult to attribute to nonfinancial explanations such as differences in demand, but is consistent with binding credit constraints for focused firms.

Table 8
Firm Inventory Growth—Manufacturers

Variable	Bank dependent	Bank independent	Bank dependent	Bank independent	Bank dependent	Bank independent	Bank dependent	Bank independent
	Model 1: base		Model 2: expanded base		Model 3: growth in sales control		Model 4: firm fixed effects	
Intercept	0.156*** (0.040)	0.152* (0.085)	0.145*** (0.043)	0.152* (0.084)	0.087*** (0.030)	-0.024 (0.055)	2.326*** (0.172)	2.414*** (0.480)
Focus dummy	0.111*** (0.019)	0.043 (0.029)	0.107*** (0.019)	0.043 (0.029)	0.015 (0.014)	-0.025 (0.021)	0.029 (0.038)	-0.050 (0.083)
Recession dummy	-0.144*** (0.023)	-0.129*** (0.027)	-0.120*** (0.038)	-0.141** (0.061)	-0.028* (0.016)	-0.012 (0.017)	-0.102*** (0.024)	-0.066** (0.028)
Recession dummy*focus dummy	-0.122*** (0.026)	-0.032 (0.040)	-0.114*** (0.026)	-0.029 (0.040)	-0.038** (0.020)	0.008 (0.027)	-0.075*** (0.029)	-0.032 (0.047)
Firm cash/assets	0.873*** (0.087)	0.763*** (0.200)	0.959*** (0.109)	0.745*** (0.244)	0.435*** (0.064)	0.297** (0.118)	0.830*** (0.141)	1.386*** (0.268)
Firm debt/assets	0.119** (0.048)	0.059 (0.082)	0.140** (0.066)	0.065 (0.104)	0.032 (0.035)	0.009 (0.052)	-0.481*** (0.095)	-0.130 (0.155)
Firm CAPX/assets	1.232*** (0.181)	0.582* (0.341)	1.210*** (0.182)	0.569* (0.338)	0.341*** (0.122)	0.280 (0.218)	0.441** (0.199)	0.055 (0.366)
Firm OPM	1.123*** (0.141)	0.843*** (0.191)	1.011*** (0.163)	0.793*** (0.226)	0.577*** (0.104)	0.425*** (0.153)	1.154*** (0.194)	0.862*** (0.292)
Log of firm sales	-0.047*** (0.006)	-0.031*** (0.009)	-0.048*** (0.006)	-0.030*** (0.009)	-0.026*** (0.004)	-0.006 (0.006)	-0.424*** (0.033)	-0.323*** (0.061)
Firm sales growth					0.929*** (0.021)	0.918*** (0.053)		

Table 8
(continued)

Variable	Bank dependent	Bank independent	Bank dependent	Bank independent	Bank dependent	Bank independent	Bank dependent	Bank independent
	Model 1: base		Model 2: expanded base		Model 3: growth in sales control		Model 4: firm fixed effects	
Firm cash/assets* recession dummy			−0.341** (0.158)	0.052 (0.355)				
Firm debt/assets* recession dummy			−0.041 (0.092)	−0.006 (0.147)				
Firm OPM* recession dummy			0.506* (0.293)	0.233 (0.389)				
Adjusted-R ²	0.1463	0.1025	0.1471	0.1014	0.5423	0.5786	0.3774	0.3353
Number of observations	7,372	1,858	7,372	1,858	7,372	1,858	7,372	1,858

The dependent variable is firm inventory growth over the two-year observation period. Models 1, 2 and 3 include firm two-digit SIC code fixed effects (industry fixed effects), while Model 4 includes firm fixed effects. The sample consists of only manufacturing focused and diversified firms, defined as firms with SIC codes beginning with a 2 or a 3. Focused firms are firms reporting a single business segment for the fiscal year preceding the two-year observation period, while diversified firms are firms reporting at least two business segments. The periods 1979–1980, 1981–1982, and 1990–1991 are classified as recessions, while the periods 1983–1984, 1986–1987, 1988–1989, 1992–1993, and 1994–1995 are classified as nonrecession periods using NBER business cycle data. Specifications are conditional on whether the firm has a bond or commercial paper rating (bank-independent) or does not have a bond or commercial paper rating (bank-dependent). All model specifications contain a time trend variable (coefficient not shown) defined as the distance, in years, of the observation period from 1979. See Table 1 for detailed definitions of the other variables. All estimations correct the error structure for heteroscedasticity and within industry-period error correlation using the Huber-White robust estimator. Values in parentheses are standard errors. Asterisks (**, *, **) denote coefficients significantly different from zero at the 1%, 5% and 10% level, respectively.

5. Concluding Remarks

We provide evidence that differences in access to credit cause focused firms to perform differently from diversified firms in the product market. We show that bank-dependent focused firms experience a disproportionately large drop in sales growth and inventory growth during recessions. We rule out a number of alternative explanations for our results and control for endogeneity using an instrumental variables procedure. We show that, as predicted by theory, our results hold only within the subsample of bank-dependent firms.

In future work researchers can examine whether managers of diversified firms use their better access to credit to enhance or to destroy shareholder value. For example, Inderst and Muller (2003) and Faure-Grimaud and Inderst (2005) suggest that managers of diversified firms may prey upon credit-constrained focused firms. Our results are consistent with predation by diversified firms during recessions. However, better access to credit may also allow diversified firms to overinvest during recessions. Binding credit constraints may convey valuable information to managers of focused firms about the optimal level of investment or may discipline managers by reducing free cash flow. Exploring the costs and benefits of credit constraints as they relate to diversification might prove to be an interesting research topic.

Researchers can also examine whether bank-dependent focused firms have different stock return behavior from bank-dependent diversified firms. Perez-Quiros and Timmerman (2000) find that the risk and expected returns of small firms rise during recessions compared to those of large firms because of binding credit constraints. To the extent that bank-dependent focused firms are credit constrained, their risk and expected returns may also rise during recessions. We hope to explore some of these ideas in future research.

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