Capital Structure in Small Manufacturing Firms: Evidence from the Data

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This article examines theories of capital structure pertaining to small firms and looks at the capital structure of small to mid-sized manufacturing firms within the context of those theories. Results provide support for Leland and Pyle's (1977) Signaling Theory, Myers' (1984) Pecking Order Theory, Berger and and Udell's (1998) Life Cycle Theory. Contrary to the findings of prior research, these results revealed that industry sector was not a significant determinant of capital structure. Rather, these findings show that capital structure in small to mid-sized firms is determined by measures of firm size, firm age, organizational status, profitability, and asset structure.

I.   The Role of Manufacturing in the U.S. Economy

Manufacturing firms are defined as those establishments "engaged in the mechanical, physical, or chemical transformation of materials, substances, or components into new products" (Annual Survey of Manufactures, 2006). According to the U.S. Census Bureau, there were 378,142 manufacturing firms in the United States in 2004. These firms employed 13.4 million individuals for a total payroll of $569.2 billion. Although employment in the manufacturing sector declined by almost 18 percent in the decade from 1995 to 2005, manufacturing continues to play an important role in the U.S. economy.

In terms of production, manufacturing firms shipped $4.3 billion in goods in 2004 representing 12.8 percent of Gross Domestic Product (Annual Survey of Manufactures, 2006). The largest industries within the manufacturing sector are food manufacturing, computer and electronics, motor vehicles and parts, fabricated metals, chemicals, and machinery. In spite of employment declines, productivity growth in manufacturing has been consistently stronger than

productivity growth in any other sector. Throughout the 80s and 90s, in fact, manufacturing productivity grew at twice the rate of productivity for all sectors overall (The Facts About Modern Manufacturing, 2003).

Manufacturing is an important source of innovation, or the development of new products, technologies, and processes. According to a report published by the National Association of Manufacturers, 62 percent of the research and development spending in the United States in the year 2000 was undertaken by the manufacturing sector (The Facts About Modern Manufacturing, 2003). Manufacturing firms also stimulate the economy through capital expenditures, or the purchase of facilities, equipment, and machinery. In 2004, the manufacturing sector generated capital expenditures of $114.4 billion (Annual Survey of Manufactures, 2006).

Manufactured goods account for a high percentage of exported goods, $782 billion or 61 percent of the total in 2005 (Facts About U.S. Manufacturing, 2006). In this sense, the manufacturing sector is more globalized than other sectors of the economy. In terms of exports, the dominant industries are computers and electronics and transportation equipment. Many small, as well as large firms, are involved in international trade which gives them access to new customers, markets, and sources of supply. Approximately one-third of the exports of manufactured goods are produced by smaller firms (Today's Small and Medium Manufacturers, 2001).

On average, workers in the manufacturing sector are more highly compensated than workers in other sectors. In 2003, the average manufacturing compensation in the U.S. was $40,762 compared to $35,634 for all sectors (2003 County Business Patterns, 2006). Manufacturing is also important because of the "multiplier effect", or its ability to generate other jobs in the economy. According to the National Association of Manufacturers, the manufacturing sector has a multiplier effect of 1.43 compared to .71 for the service sector (The Facts About Modern Manufacturing, 2003). Thus, every $1 of manufacturing product sold generates an additional $1.43 of intermediate economic output.

Surprisingly, a very high percentage, over 98 percent, of manufacturing firms fit the U.S. Small Business Administration's definition of a small business, or a firm with 500 or fewer employees (County Business Patterns, 2003). According to the National Association of Manufacturers, smaller firms employ approximately half of all manufacturing employees and account for over one-third of manufacturing sales and receipts (Today's Small and Medium Manufacturers, 2001). These firms are typically family-owned and operated. Many are organized as S-corporations meaning that profits and losses flow through to the individual shareholders, i.e. the owners and key managers. Typically the owner/managers reinvest a substantial portion of profits into the firm in the form of machinery, equipment, or technology. Their personal wealth and prosperity are thus closely tied to that of their firm and its industry. These smaller firms and their capital structure decisions serve as the focal point for this research.

II.   Capital Structure Theory and Small Manufacturing Firms

Capital structure refers to the mix of debt and equity used by firms to finance their long-term (fixed) assets. Debt is capital that has been loaned by other parties and must be repaid. In contrast, equity represents the investment made by owners or shareholders and is a permanent source of capital.   As with other inputs to the firm, i.e. labor, equipment, facilities, both debt and equity have a cost. The mix of long term debt and equity is referred to as the firm's capital

structure. The blended cost of the various sources of long term debt and equity is referred to as the weighted average cost of capital (WACC).

Within the field of finance, capital structure theory is grounded in the work of Modigliani and Miller (1958) who initially wrote on the subject of capital structure in the electric utility industry. This theory, henceforth referred to as M&M, contends that firms will select the mix of debt and equity that maximizes the value of the firm and minimizes its weighted average cost of capital, both of which, in their theory, occur simultaneously. M&M's work was groundbreaking at the time, and has served as the basis for capital structure theory for almost fifty years.

Unfortunately, however, M&M does not necessarily hold for small privately held firms, because it is based on the assumption that there are no transaction costs of any kind and that investors and managers have the same information about the firm. Further, it assumes that firms have access to the full range of debt and equity alternatives. In fact, however, the cost of issuing public debt or equity is prohibitive for small firms, and informational asymmetries abound. Unlike, larger, publicly held firms, small firms typically do not have the option of issuing shares and bonds. Thus, they tend to be heavily reliant on other sources of capital including bank loans, trade credit, personal sources of capital, and, in some instances, governmental sources of funding.

Leland and Pyle (1977) put forth a "signaling" theory. They noted that the problem of asymmetric or incomplete information in small firms makes it difficult for lenders to accurately assess the level of risk. Thus, an entrepreneur's willingness to invest in his own firm serves as a signal regarding the quality of the firm's assets and earnings prospects. In privately held firms, in particular, owners, as insiders, have superior information regarding the condition of the firm compared to outside lenders or investors. The implication of this is that firm owners who are confident about the prospects of their firm will be more willing to invest their own funds, retain earnings, or take on external debt as opposed to seeking external equity investors who would desire a share of future earnings and profits.

Myers (1984) and Myers and Majluf (1984) developed a "pecking order" theory of finance. According to this theory, insiders have information about the firm that outsiders do not necessarily have. Because of this informational asymmetry, outside share purchasers will tend to under-price a firm's shares. In light of that, insiders prefer to use internal equity in the form of retained earnings or debt before they resort to issuing external equity. As noted by Coleman and Cohn (2000), the pecking order theory is particularly applicable to firms that are small and privately held, precisely because the informational asymmetries are so large. Since small, privately held firms do not publish annual reports or submit reports to the Securities and Exchange Commission, their financial statements are not publicly available. Thus, outsiders have no way of knowing the financial condition of the firm. Their response to this lack of information is to assume a higher level of risk, and in turn, to demand a higher cost for equity capital. External equity is very costly for small, privately held firms, and is typically their last choice in terms of financing alternatives.

Berger and Udell (1998) put forth a "life cycle" theory of financing which contends that firms use different types of financing for different stages of growth. They noted that small, privately held firms, in particular, are "informationally opaque". Thus, they have a difficult time obtaining external sources of financing and tend to be more reliant on insider financing such as the personal financial resources of the firm owners, and, in instances where the firm is profitable, retained earnings. According to Berger and Udell, when firm owners do have to

turn to external sources of financing, their preference is for debt rather than equity, because debt does not require them to give up ownership or control of the firm.

Ang (1992) also addressed the problem of asymmetric information and its implications for smaller firms. He noted that one of the basic assumptions in M&M is for "perfect markets" which assume that investors and managers have the same information about the firm. In the case of small, privately-held firms, however, insiders obviously have access to information that outside investors do not have access to. In light of this informational deficit, small firms may have a more difficult time securing external sources of financing, or, if they are able to obtain financing, the cost of capital will be higher.

III.   Prior Research Involving Small Firms

How do these various capital structure theories actually play out in studies involving small firms? Holmes and Kent (1991) conducted a study of almost 3,000 small Australian manufacturing firms to find that the most common types of financing were bank loans and supplier credit, both short term sources. They concluded that their results provided support for Myers' Pecking Order Theory in that owners do not want to dilute their ownership claim by taking on additional external equity. Similarly, when they use debt, they prefer to use short term sources which are less restrictive in terms of covenants. Interestingly Holmes and Kent also found that firms at the smaller end of the spectrum in their study were less aware of possible sources of financing than larger firms. They referred to this as the "knowledge gap" and noted that the owner/managers of smaller firms do not have the time to research financing alternatives beyond the fairly obvious and traditional sources.

In a study of over 900 small U.S. firms, Chaganti, DeCarolis, and Deeds (1995) found that owners who felt confident about the future of their firms preferred to use internal equity rather than debt or external equity. They concluded that their findings supported Myers' Pecking Order Theory, and that the use of internal equity by optimistic business owners has a signaling effect regarding the prospects of the firm. In this sense, their findings were consistent with the earlier work of Leland and Pyle (1977) as well.

Chittenden, Hall, and Hutchinson (1996) also found support for the Pecking Order Theory in a study involving over 3,000 small British firms. They found that profitable small firms funded their operations with retained earnings, while less profitable firms funded them with debt. In turn, smaller, younger firms that have not established a track record of profitability tend to rely on short term rather than long term debt. Chittenden et al. concluded that Modigliani and Miller's theory of capital structure would not hold for small firms because, for them, access to capital is a major issue. Many small firms simply do not have access to the full range of debt and equity alternatives.

Michaelas, Chittenden, and Poutziouris (1998) authored a very interesting study in which they conducted in-depth interviews with a sample of thirty small U.S. companies. They found that firms preferred not to raise external equity in particular, because they did not want to dilute control. Their findings revealed that retained earnings were the most important source of financing followed by trade credit and then bank loans, consistent with Myers' Pecking Order Theory. They also found that growth-oriented firms were more likely to use external sources of financing, because they had exhausted their internal sources of capital.

Two studies using data from the National Survey of Small Business Finances provide support for Berger and Udell's life cycle theory of financing which states that the various stages of firm size and growth have an impact on the types of capital required. Using data on

approximately 4,000 U.S. firms included in the 1993 National Survey of Small Firm Finances, Cole and Wolken (1995) found that only one-quarter of the smallest firms but three-quarters of the largest firms used bank loans. Thus, smaller firms were much more likely to rely on internal sources of financing. Similarly, Gregory, Rutherford, Oswald, and Gardiner (2005) found that larger firms were more likely to use public equity and long term debt than smaller firms. As in the Cole and Wolken study, they found that smaller firms were more reliant on insider financing leading them to conclude that both firm size and age are linked to the types of financing used.

In a study of small Greek manufacturing firms, Voulgaris et al. (2004), examined the link between asymmetric information and the use of debt. They noted that the problem of information asymmetry is more severe for small firms causing lenders to rely more heavily on collateral. Their findings revealed that firm size was positively related to the use of both total debt and long term debt. Conversely, smaller firms were more reliant on short term debt. The authors concluded that larger firms have better access to long term debt due to greater credibility and the ability to provide collateral.

A somewhat older, but important study by Edgar Norton (1991) addressed the role of owner preferences in the selection of capital sources. Norton surveyed over one hundred high growth small firms to find some support for the Pecking Order Theory; firms used internal sources of financing before turning to external sources. Norton also found, however, that half of the firms responding had target debt to equity ratios of less than 50 percent, and one-third indicated a desire for no debt or minimal debt. Based on his findings, he concluded that managerial preferences play a role in the capital structure decision-making. Hutchinson (1995) echoed this observation by noting that capital constraints may be driven by demand side considerations as well as by supply side difficulties. He observed that the owner/managers of small firms tend to be risk averse and also want to avoid dilution of ownership. Thus, they are averse to using outside sources of equity that would dilute ownership control, preferring debt, typically in the form of bank loans. These same owner/managers are then attracted to low risk and low growth projects that provide more predictable cash flows in order to service their debt. The upshot of these preferences is that the owner/managers of small firms avoid external sources of capital, particularly external equity, and they also avoid higher risk types of projects which might lead to higher rates of growth.

Several studies indicate that industry sector has an effect on capital structure. Different industries require different levels and types of assets which may, in turn, dictate different sources of financing. In keeping with this theory, Bradley et al. (1984) used Compustat data for the period of 1962-81 to find that fifty-four percent of the variation in firm leverage could be explained by industry classification. They also found significantly more variation in mean leverage ratios across industries rather than within industries. Hall et al. (2000) had similar findings in a study of 3500 small, privately owned British firms. In that study, manufacturing firms had significantly higher levels of leverage than firms in the education and hospitality industries. Lopez-Gracia and Aybar-Arias (2000) studied a sample of 445 Spanish firms to find that both size and industry sector had an effect on the types of financing used. They concluded that small firms actually operate without a target capital structure and prefer forms of financing that minimize intrusion such as personal savings, retained earnings, and debt.

IV.   Empirical Analysis

Data for this study were drawn from the 1998 Survey of Small Business Finances (SSBF) which is conducted by the Federal Reserve every five years. The 1998 Survey is the most recent for which data are publicly available. It includes financial statement data and information on the use of financial products and services for 3,561 small firms in the United States. In this instance, a small firm is defined as one having 500 of fewer employees. According to the U.S. Small Business Administration, over 95 percent of U.S. firms fall into that category (Frequently Asked Questions, 2005).   The SSBF is the largest and most comprehensive data set of its type representing a national sample of firms stratified by geographic region, industry sector, gender, and race. Sample weights were provided to allow for population estimates, and those weights have been used in this analysis.

A.   Univariate Comparisons

Table I provides univariate comparisons for manufacturing and non-manufacturing firms for variables of interest. Within the data sample, there were 389 firms classified as manufacturing firms and 3,172 firms classified as belonging to other industry sectors. Table I reveals that the manufacturing firms were significantly larger than non-manufacturing firms in terms of total assets, total sales, and total number of employees. Median values for assets, sales, and number of employees were considerably lower for both manufacturing and non-manufacturing firms, however, indicating that results for both were skewed by the presence of larger firms. As an example, the mean value for Total Assets for manufacturing firms was $958,838 while the median value was a considerably more modest $96,977. Nevertheless, manufacturing firms were still larger than non-manufacturing firms in terms of median values as well.   Table I also reveals that manufacturing firms were somewhat older than non-manufacturing firms, although the difference was not statistically significant.   In terms of profitability, manufacturing firms were significantly less profitable than non-manufacturing firms (20.84% vs. 27.82%). On average, however, both manufacturing and non-manufacturing firms in the sample were quite profitable.

One would anticipate a different asset composition for manufacturing firms than for firms in other industry sectors, specifically a higher level of fixed assets in the form of plant and equipment. This proved to be the case, since manufacturing firms had a significantly higher ratio of fixed assets to total assets than non-manufacturing firms (33.68% vs. 28.69%). In light of the higher level of fixed assets that could be used as collateral, one would also anticipate a higher level of debt, long term debt, and loans obtained from financial institutions. Table I reveals that this was true in this instance, although the differences were not statistically significant.   Manufacturing firms had a ratio of total debt to total assets of 47.7 percent compared to 43.14 percent for non-manufacturing firms. Similarly, they used a higher level of long term debt to finance their assets, 24.82 percent compared to 22.73 percent.   Finally, manufacturing firms obtained a higher percentage of their loans from external sources (vs. trade credit) than non-manufacturing firms (32.95% vs. 29.19%).

Table II provides further clarification on the use of loans by manufacturing firms and the types of loans employed. It notes that a significantly higher percentage of manufacturing firms were organized as limited liability entities, 58.72 percent compared to 43.72 percent. This more "corporate" form of organization may serve as an advantage in securing external capital since it may imply a higher level of organizational sophistication and staying power.

Although there were no significant differences between manufacturing and non-manufacturing firms in terms of the likelihood of having some type of loan (Haveloan), manufacturing firms were significantly more likely to have a line of credit, lease, equipment loan, other loan, or a loan from stockholders than non-manufacturing firms. Conversely, non-manufacturing firms were significantly more likely to have a commercial mortgage. They were also more likely to have a vehicle loan, although the difference between manufacturing and non-manufacturing firms was not significant. These distinctions make sense, because manufacturing firms are more likely to have assets that can be used for collateral for lines of credit, leases, equipment loans, or other loans. Similarly, in the case of non-manufacturing firms, their sources of debt, particularly long term debt, are dictated by the assets that they have available to secure them, specifically commercial buildings or vehicles used for the business.

Surprisingly, a rather high percentage of manufacturing firms also used business credit cards and personal credit cards as a source of financing for their business, and in the case of business credit cards, the difference was significant. Table II reveals that 39.33 percent of manufacturing firms used a business credit card compared to 33.6 percent of non-manufacturing firms. In terms of personal credit cards, 48.71 percent of manufacturing firms used them for business purposes compared to 45.76 percent of non-manufacturing firms. Given the high interest rates associated with credit cards, one would expect firms to use them only as a last resort. Alternatively, however, credit cards provide easy access to unsecured credit and convenience which may override the disadvantage of their higher cost.

B.   Multivariate Analysis

Overall, the univariate findings indicate that manufacturing firms in the sample were larger in terms of assets, sales, and employees, more capital intensive in terms of the ratio of fixed assets to total assets, and less profitable as measured by return on sales. All of these factors would seem to dictate a greater demand for external sources of capital, and possibly different capital structure choices than one might find in non-manufacturing firms.   A shortcoming of univariate analysis, however, is that it examines the effect of only one variable in isolation.   In contrast, multivariate analysis allows for the examination of several independent variables acting in concert on the dependent variable, in this instance some measure of capital structure. A regression model was developed to test the relationship between various measures of capital structure and firm characteristics including size, age, organizational status, profitability, asset structure, and industry sector. The model had the following firm:

Model 1:
$$TDTA = a + b_1 logsales + b_2 firmage + b_3 org + b_4 ROS + b_5 FATA + b_6 manuf + e$$

The dependent variable, TDTA, represents the ratio of total debt to total assets and is used in this instance as a measure of capital structure. Prior research suggests that smaller firms are more reluctant to use external equity because they do not want to dilute ownership control (Norton, 1991; Hutchinson, 1995). This would suggest a higher ratio of total debt to total assets for small firms in general. The hypothesis of this research is that small manufacturing firms in particular will have an even higher level of total debt to total assets than small firms in other industries. This hypothesis is consistent with the results of earlier studies

conducted by Bradley et al. (1984), Hall et al. (2000), and Lopez-Gracia and Aybar-Arias (2000).

Independent variables are defined in the Appendix. Sales were used as a measure of firm size since prior research indicates that larger firms have a greater demand for both debt and equity thus implying a positive relationship between sales and the dependent variable (Cole & Wolken, 1995; Gregory et al., 2005; Voulgaris et al., 2004). The logged form of the sales variable was used (Logsales), since Table I revealed that sales were highly skewed. Firm age was selected as a variable, because one would anticipate that younger firms that are still growing would have a greater demand for capital than mature firms. Mature firms, having lower growth rates, are often able to use retained earnings as a source of financing, and thus do not require as much external financing (Gregory et al., 2005). If this relationship proves to be the case, one would anticipate a negative sign for the variable "Firmage". Organizational status (Org) was used as an independent variable, because it may serve as an indication of organizational sophistication and maturity. This, in turn, could provide greater access to capital, implying a positive relationship between the variable "org" and the dependent variable.

Return on sales (ROS) was used as a measure of profitability. Unlike return of equity (ROE), ROS is not directly affected by the firm's capital structure. Similarly, unlike return on assets (ROA), ROS is less likely to be determined by firm size. In contrast, return on sales provides a fairly direct measure of the firm's ability to manage expenses relative to revenues. Prior research suggest that more profitable firms are less likely to require external sources of capital, because retained earnings can be used as a major source of financing (Chittenden et al., 1996; Michaelas et al., 1998). Thus one would anticipate a negative relationship between ROS and the dependent variable.

As noted in Table II, manufacturing firms have a higher level of fixed assets than non-manufacturing firms. This implies a greater need for sources of capital to finance those assets which in turn can be used as collateral on loans (Esperanca et al., 2003; Sogorb, 2005), suggesting a positive relationship between capital intensity and the use of debt. The ratio of fixed assets to total assets (FATA) was used as a measure of asset structure. Finally, the independent variable "Manuf" divides the sample into manufacturing and non-manufacturing firms. The review of prior research cites several studies that found that capital structure is at least partially determined by industry sector (Bradley et al., 1984; Hall et al. 2000; Lopez-Gracia & Aybar-Arias, 2000). If this is the case, one would anticipate that manufacturing firms are both willing and able to use higher levels of debt than non-manufacturing firms. Manufacturing firms tend to be both larger and more capital intensive, both of which typically lead to a higher demand for capital. Further, manufacturing firms may be easier for lenders to understand and evaluate, because they produce tangible products using tangible assets. This is in contrast to many service firms that rely on more difficult to grasp intangible assets and human capital.

C.   Multivariate Results

The results of Model 1 are presented in Table III. Results reveal that significant variables included measures of firm size, firm age, organizational status, profitability, and asset structure. The industry variable was not, however, significant. The variable used to represent firm size, Logsales, was significant and positive indicating that, on average, larger firms carry higher levels of debt as suggested by prior research. Larger firms may be more attractive to lenders because they take out larger loans which are, in turn, less labor intensive. Similarly, the

mere size of larger firms may give the impression of greater stability and staying power. Larger firms may also be in a better position to use trade credit as a source of financing, because they can exert a greater degree of market power on their suppliers than smaller firms can.

The variable representing firm age (Firmage) was significant and negative, as anticipated, indicating that younger firms use a higher degree of leverage. This finding is consistent with Berger & Udell's (1998) Life Cycle Theory which states that firms use different types of financing at different stages of their development. Younger firms that are still growing may require capital to fund product development, facilities, or expansion. Similarly, as younger firms, they are less likely to have earnings that could be used as a source of financing. The variable representing organizational status (Org) was significant and positive. Thus, firms organized as limited liability entities were more likely to use higher levels of debt. This could be because the limited liability form of organization shields their owners from the risk of personal bankruptcy. Alternatively, lenders may feel that firms organized as corporations or limited partnerships have a higher level of sophistication and are less likely to experience financial distress.

As suggested by prior research, the variable representing profitability (ROS) was significant and negative. Profitable firms can self-fund from retained earnings as opposed to using external sources of debt or equity. This finding is consistent with Myers' Pecking Order Theory which contends that firms prefer internal rather than external sources of financing. By using retained earnings rather than new external equity, the original owners are able to retain ownership and control, and they do not have to share future profits with new equity holders. Further, by using retained earnings rather than debt, owner managers are able to avoid the risks and restrictions that may accompany the use of debt. The use of debt increases the risk of financial distress and bankruptcy, and lenders may also impose restrictive covenants which limit the operating flexibility of the firm.

The variable measuring asset structure, the ratio of fixed assets to total assets (FATA) was significant and positive, revealing that, as anticipated, firms with higher levels of fixed assets carry higher levels of debt. Firms with high levels of fixed assets obviously need capital to finance those assets which, in turn, can be used as collateral on loans. The availability of collateral reduces the riskiness of the loan to the lender and may increase the availability of capital to the borrower. In this sense, the availability of fixed assets that can be used as collateral serves to alleviate the problem of asymmetric information noted by Ang (1992).

The variable representing industry classification (Manuf) was not significant, contrary to prior research. In this study, industry classification by itself did not differentiate between firms using different capital structures. Rather, specific firm characteristics, in this instance size, age, organizational status, profitability, and asset structure, differentiated between firms using higher and lower degrees of leverage.

D.   Further Analysis

Two additional models were constructed to further explore the relationship between specific firm characteristics and capital structure. In the second model, the ratio of externally obtained loans to total assets (Xloans) was used as the independent variable while in the third model, the ratio of long term debt to total assets (LTDTA) was used as the dependent variable. The models took the following form:

Model 2
Xloans = $a + b_1$logsales + $b_2$firmage + $b_3$org + b_4ROS + b_5FATA + $b_6$manuf + e

and

Model 3
LTDTA = $a + b_1$logsales + $b_2$firmage + $b_3$org + b_4ROS + b_5FATA + $b_6$manuf + e

The results for Models 2 and 3 are also presented in Table III. In Model 2 the ratio of externally obtained loans to total assets was used as the dependent variable and as a measure of capital structure. External loans are typically obtained from a bank or some other type of financial institution. Since bank loans are a major source of financing for small and mid-sized firms, it is important to identify the firm characteristics that lead to obtaining them. The results for Model 2 were very similar to those for Model 1. As in the earlier model, measures of firm size, firm age, organizational status, profitability, and asset structure were significant while industry classification was not. This implies that banks and other financial institutions prefer to lend to companies that are larger, that have the corporate form of organization, and have assets that can be used as collateral. Alternatively, younger firms are more likely to seek loans from financial institutions, while more profitable firms are less likely to do so.

In Model 3, the dependent variable was the ratio of long term debt to total assets (LTDTA). Firms that are able to use a higher level of long term debt are protected from the dual risks of credit availability and interest rate fluctuations. Unlike short term debt which can be called or cancelled at any point in time depending on the condition of the economy, the lender, or the individual company, long term debt is in place for a period of time; the company does not have to worry about renewing it or keeping it. Similarly, unlike short term debt, long term debt does not re-price frequently in a rising rate environment. Thus, owner/managers can forecast the level of interest expense more accurately are and less likely to be caught a profit squeeze that could result from both declining revenues and rising interest rates.

In this model neither the size variable (Logsales) nor the industry variable (Manuf) were significant. Unlike the first two models, larger firms were no more likely to carry higher levels or long term debt than smaller firms. This is an interesting finding, because it suggests that long term debt is actually more available to smaller firms than short term debt which is, in fact, more risky. This may be because long term debt is typically secured by specific assets, whereas short term debt is typically unsecured. Because of the greater risk associated with smaller firms, those firms may only be able to obtain debt that is secured by specific assets. This would mean that they are less reliant on lines of credit and trade credit, the major sources of unsecured, short term debt. As in the first two models, the variable representing industry sector (Manuf) was not significant. Thus, as previously noted, simply being a manufacturing firm does not necessarily lead to a higher levels of long term debt.

V.   Summary and Conclusions
The most important finding of this research is that industry sector on its own does not dictate the capital structure of small firms. In this sense, these results conflict with the findings of prior research. Rather, these findings demonstrate that capital structure is determined by firm characteristics including size, age, organizational status, profitability, and asset structure. Larger firms tend to use as higher percentage of debt as do firms organized as limited liability

entities. Larger firms are more attractive to lenders, because they would typically take out larger and, hence, more profitable, loans. Similarly, larger firms have a higher degree of market power, and are thus in a better position to use trade credit as a source of financing. Firms organized as corporations may have more sophisticated systems of financial management and reporting which may give them an advantage in dealing with lenders.

These findings reveal that younger firms also tend to have higher debt ratios, probably because they are still growing and are not yet at the point where they can generate sufficient earnings to self-fund. In this sense, these results are consistent with Berger and Udell's (1998) Life Cycle Theory which states that firms use different sources of capital at different stages of their development. Conversely, more profitable firms use lower levels of debt, because they are able to self-fund with retained earnings. Thus, these findings are consistent with Myers' Pecking Order Theory (1984) which contends that firms prefer to use internal equity first as a source of financing before turning to external sources of debt or equity. Myers further contends that firms are particularly averse to using external equity, because it requires them to relinquish ownership and control. The use of retained earnings as a funding source by profitable firms may also provide support for Leland and Pyle's (1977) Signaling Theory which states that when firm owners are optimistic about the prospects for their firms, they prefer to reinvest their own earnings rather than sharing future profits and ownership with outside investors.

These results also reveal that asset structure is an important determinant of capital structure. Firms with a high ratio of fixed assets to total assets use higher levels of total debt, external loans, and long term debt. This finding makes sense, since one would anticipate that capital intensive firms would have a greater demand for external capital to fund their higher level of fixed assets. Similarly, capital intensive firms may be more attractive to lenders, because of the presence of assets that can be used as collateral. The use of collateral is one of the ways in which firms and lenders can at least partially alleviate the problem of asymmetric information noted by Ang (1992). Although capital intensity is a characteristic of the manufacturing sector, it is also a characteristic of other industry sectors, i.e. transportation and construction, as well as many types of retail and service firms. These findings seem to imply that asset structure rather than industry sector is what drives capital structure.

An important implication of these findings is that firms with higher levels of fixed assets, which include manufacturing firms, do use and require higher levels of external capital in the form of debt financing. This implies a demand for both available and affordable sources of debt capital. Earlier in this article, the importance of manufacturing to the economy overall was noted. In recent years, that sector has been thriving; sales and profits have been strong, and globalization has opened up many new markets for U.S. firms. Simultaneously, there has been a lot of liquidity in the banking sector, and interest rates have been low. This availability and affordability of capital has enabled small and mid-sized manufacturing firms to purchase equipment, develop new products and processes, add employees, and grow. As we move into a more mature phase of the business cycle, accompanied by slowing demand and higher interest rates, it will be important to monitor the continued availability bank debt, in particular, to ensure that smaller firms are able to obtain sufficient capital to remain competitive in both domestic and global markets.

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Appendix
Definition of Variables

Total Assets: Total assets for 1998

Total Sales: Total sales for 1998

Total Employees: Total number of workers for 1998

Firm Age (Firmage): Age of the firm expressed in years

ROS: Return on sales; net income divided by total sales (1998). Firms with negative profits were assigned an ROS of 0. Firms with an ROS of greater than 100 percent were assigned an ROS of 100 percent.

FATA: The ratio of fixed assets to total assets (1998)

TDTA: The ratio of total debt to total assets (1998)

LTDTA: The ratio of long term debt to total assets (1998). Long term debt is defined in this instance as the sum of leases, mortgages, vehicle loans, equipment loans, other loans, and stockholder loans.

Xloans: The ratio of loans obtained from external sources to total assets

Organization (Org): Dichotomous variable coded as a "1" if the firm was organized as some type of limited liability entity, i.e. a corporation or and limited partnership

Have Loan: Dichotomous variable coded as a "1" if the firm had one of the six types of loans tracked by the SSBF; line of credit, financial lease, commercial mortgage, equipment loan, vehicle loan, or other loan

Line of Credit: Dichotomous variable coded as a "1" if the firm had a line of credit

Lease: Dichotomous variable coded as a "1" if the firm had a financial lease

Commercial Mortgage: Dichotomous variable coded as a "1" if the firm had a commercial mortgage

Vehicle Loan: Dichotomous variable coded as a "1" if the firm had a vehicle loan

Equipment Loan: Dichotomous variable coded as a "1" if the firm had an equipment loan

Appendix
Definition of Variables
(continued)

Other Loan: Dichotomous variable coded as a "1" if the firm had some other type of loan

Stockholder Loan: Dichotomous variable coded as a "1" if the firm had some type of loan from a stockholder

Bus. Credit Card: Dichotomous variable coded as a "1" if the firm owner had a business credit card that was used for business purposes

Pers. Credit Card: Dichotomous variable coded as a "1" if the firm owner had a personal credit card that was used for business purposes

Table I
Characteristics of Small Manufacturing Firms included in the 1998 SSBF

	Manuf.	Non-Manuf.	T statistic	Prob>t
Number	389	3172		
Total Assets**				
Mean	958,839	364,708	4.91	0.0001
Median	96,977	51,150		
Total Sales**				
Mean	1,980,0000	893,582	2.82	0.0049
Median	201,476	148,417		
Total Employees**				
Mean	14.47	8.04	4.58	0.0001
Median	4.0	3.0		
Firm Age				
Mean	14.10	13.27	1.24	0.2156
Median	11.0	11.0		
ROS**				
Median	20.84%	27.82%	3.98	0.0001
Mean	10.20%	18.58%		
FA/TA**				
Mean	33.68%	28.69%	2.62	0.0087
Median	27.20%	15.41%		
TD/TA				
Mean	47.70%	43.14%	1.86	0.0630
Median	42.81%	33.58%		
LTD/TA				
Mean	24.82%	22.73%	1.01	0.3124
Median	5.46%	.71%		
Xloans				
Mean	32.95%	29.19%	1.66	0.0962
Median	14.23%	8.2%		

**differences between manufacturing and non-manufacturing firms were significant at the .01 level

Table II
Characteristics of Small Manufacturing Firms included in the 1998 SSBF

	Manuf.	Non-Manuf.	Chi-square	Prob>Chisquare
Number	389	3172		
Organization**	58.72%	43.72%	24.7250	0.0001
Have Loan	58.54%	54.73%	1.6001	0.2059
Line of Credit**	34.22%	27.11%	6.8551	0.0088
Lease**	16.70%	10.04%	12.7348	0.0004
Commercial Mort.**	7.64%	13.69%	8.7014	0.0032
Vehicle Loan	18.08%	20.71%	1.1510	0.2833
Equipment Loan**	16.48%	9.30%	15.7309	0.0001
Other Loan**	17.21%	9.17%	19.8433	0.0001
Stockholder Loan**	24.65%	13.29%	28.7453	0.0001
Bus. Credit Card*	39.33%	33.60%	3.9851	0.0459
Pers. Credit Card	48.71%	45.76%	0.9569	0.3280

*differences between manufacturing and non-manufacturing firms were significant at the .05 level
**differences between manufacturing and non-manufacturing firms were significant at the .01 level

Table III
Multivariate Analysis: Measures of Capital Structure
Parameter Estimates

Dependent Variables

Independent Variables	TDTA	Xloans	LTD/TA
Intercept	0.1180**	0.1811**	0.2026**
Logsales	0.0300**	0.0087**	0.0001
Firmage	-0.0045**	-0.0035**	-0.0031**
Org	0.1262**	0.1039**	0.0863**
ROS	-0.1658**	-0.1199**	-0.0721**
FA/TA	0.0463*	0.1341**	0.1549**
Manuf	-0.0038	0.0061	-0.0142
R-square	0.1339	0.695	0.0534
Pr>F	0.0001	0.0001	0.0001

*results significant at the .05 level
**results significant at the .01 level