

Short-Term Debt Financing During the Financial Crisis

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Abstract

The financial crisis of the late 2000s had a large effect on the capital and lending markets in the United States and overseas. The data presented here show that the financial crisis caused firms to increase the amount of short-term debt they employed from 1.3% of assets in 2006 to 2.2% in 2008. This increase in short-term debt financing was completely reversed by the end of 2009 suggesting that the increase in short-term debt financing was undesired and was reversed as soon as the financial crisis abated. The proximate causes of the spike in short-term debt financing include a reduction in accounts payable financing from suppliers and a decline in long-term debt and equity financing. A significant decrease in asset sales also contributed to the need for more short-term debt financing. A regression analysis indicated that almost all of the increase in short-term debt financing was caused by the financial crisis and not the simultaneous recession.

Key Words: Financial Crisis, Short-term Debt financing, Asset Sales

The financial crisis on the late 2000s had a major impact on the financial markets, greatly reducing security issuance by firms and lending by financial institutions. Fosberg (2012) demonstrated that one of the consequences of the disruption of the capital and lending markets caused by the financial crisis was to significantly increase the amount of long-term debt in firm capital structures. Specifically, Fosberg showed that between 2006 and 2008 the financial crisis and simultaneous recession caused sample firms to increase their market debt ratios (MDRs) by, on average, 5.5%. After eliminating the effects of the recession on firm capital structure it was found that almost all (5.1%) of the debt accumulation that occurred was a consequence of the financial crisis. Additionally, it was found that the effect of the financial crisis on firm capital structure was almost completely reversed by the end of 2010. An analysis using book debt ratios (BDRs) found similar, but smaller, financial crisis effects. The primary purpose of this study is to expand on this previous research and ascertain if the financial crisis and recession of the late 2000s had any effect on firm's use of short-term debt financing and whether the effects, if any, continued past the end of the financial crisis. I will also investigate the effect of the financial crisis on some of the sample firms' other current asset and current liability accounts.

1. Factors that May Affect Short-Term Debt Financing

According to the simplest version of the matching principle of finance, short-term assets should be financed with short-term liabilities and long-term assets should be financed with long-term liabilities (Guin (2011)). Short-term assets and liabilities are generally defined to be those items that will be used, liquidated, mature or paid off within one year. A firm's current assets (including cash, inventories, accounts receivable, etc.) are generally considered short-term assets while plant and equipment are generally considered long-term assets. On the other side of the balance sheet, current liabilities (accounts payable, short-term debt, etc.) are usually considered short-term liabilities while long-term debt (debt with a maturity of more than one year) and equity capital are considered long-term sources of financing. Defining other current liabilities (OCL) to be all current liabilities (CL) except short-term debt (STD), then according to the matching principle, the amount of a firm's short-term debt financing should be equal to the amount of its current assets (CA) less other current liabilities ($STD = CA - OCL$). This implies that there are at least two ways that a firm's short-term debt financing can change. One is if firm size changes. For example, if a firm grows the amount of its current assets will likely increase as well.

To maintain the CA = CL equality, if current assets increase then so must short-term debt and/or other current liabilities. A second source of change in a firm's short-term debt financing may exist if short-term debt and other current liabilities are substitute forms of short-term financing. Holding current assets constant, if the amount of a firm's other current liabilities increases the firm will have less need for short-term debt financing to finance its short-term assets. Conversely, if other current liabilities decrease the firm will need to increase the amount of its short-term debt financing. As a result, the financial crisis could impact the amount of a firm's short-term debt financing by either changing the amount of its current assets and/or the amount of its other current liabilities.

It's also possible that a firm's short-term debt financing could be affected by the same factors that have been shown to affect the amount of long-term debt financing that a firm employs. These factors include firm profitability, growth opportunities and non-debt tax shields like depreciation expense. Other factors that have been shown to affect the amount of long-term debt financing that a firm employs will be discussed below. See Fama and French (2002) and Flannery and Rangan (2006) for a detailed discussion of the factors that affect long-term debt financing. If these factors also affect the amount of short-term debt financing that a firm employs, the financial crisis could affect a firm's short-term debt financing through its effect on debt financing determinants like firm profitability

2. Sample Selection

An empirical examination of the effect of the financial crisis of 2007 through 2009 on firm short-term borrowing was conducted as follows. For each year from 2005 through 2010 an initial sample of firms was taken from all firms listed on the current and research files of the COMPUSTAT data base. Firms in the financial services or utilities industries were excluded from all annual samples. Companies with non-positive book value of common equity, negative values for short-term debt and current liabilities to current assets ratios of five or better were also excluded from the annual samples. To be included in the initial sample for a year a firm must have sufficient data available to calculate the firm's book and market short-term debt ratios. A firm's book short-term debt ratio (BSDR) is defined to be short-term debt divided by total assets. Short-term debt includes short-term loans and commercial paper. A firm's market short-term debt ratio (MSDR) is defined to be book short-term debt divided by the market value of the firm. Firm market value is calculated as total assets less book common equity plus market common equity (common shares outstanding times share price). This procedure yielded initial annual sample sizes ranging from 3,982 to 4,890 firms. Table 1 contains the mean values of selected variables for the sample firms for the six sample years. Looking first at MSDR, mean MSDR remained stable at .013 in 2005 and 2006 and then increased slightly to .014 in 2007. A MSDR of .013 means that 1.3% of a firm's assets were financed with short-term debt. In 2008, mean MSDR jumped to .022 but then fell to .015 in 2009 and .013 in 2010. A similar pattern exists for the BSDR. Mean BSDR remained stable from 2005 through 2007 at .019 but then jumped to .022 in 2008. By 2009 the BSDR had returned to near its pre-crisis level (.018). In sum, the data indicate that the financial crisis caused a spike in short-term borrowing by firms in 2008 that was quickly reversed when the financial crisis eased in 2009. This is very similar to the long-term debt financing pattern observed by Fosberg. A more detailed empirical analysis follows.

3. Empirical Analysis

The spike in short-term debt ratios noted above is also reflected in the dollar value of short-term debt financing for the sample firms. Mean short-term debt outstanding went from \$99 million dollars in 2006 to \$133 million in 2008. This represents a 33.3% increase in short-term debt financing during the financial crisis. However, mean short-term debt financing dropped back to pre-crisis levels (\$96 million) in 2009. This implies that the increase in short-term debt financing that occurred during the financial crisis was not desired but a necessary expedient to get them through the crisis and was quickly reversed when financial conditions improved. Next, I investigate possible causes of this pattern of short-term debt financing. Looking at accounts payable, mean accounts payable financing dropped from \$357 million in 2007 to \$336 million in 2008. This \$21 million decline in accounts receivable was completely reversed in 2009. These results suggest that a large part of the increase in short-term debt financing that occurred in 2008 was in response to a decrease in available accounts payable financing. On the current assets side, there was little change in either firm cash holdings or inventories in 2008. There was, however, a \$31 million decrease in mean accounts receivable in 2008.

This decrease in short-term financing to firm customers represents a source of capital for the firm and, therefore, could not have been driving the increase in debt financing. The decline in accounts receivable was largely reversed in 2009. Moving to long-term sources of financing, mean common equity financing decreased by \$17 million in 2008 compared to a mean increase of \$206 million in 2007. This large reduction in the amount of common equity financing in 2008 likely was a contributing factor motivating firms to increase the amount of their short-term debt financing. Mean long-term debt financing increased by \$58 million in 2008 compared to \$165 million in 2007. Although long-term debt financing continued to be a source of capital for sample firms the reduction in funds provided likely contributed to the increase in short-term debt financing in 2008. A reduction in asset sales also seems to have contributed to the need for an increase in short-term debt financing. Mean asset sales decrease from \$199 million in 2007 to \$148 million in 2008 resulting in a \$51 million decrease in financing from asset sales. In sum, the reduction in funding from asset sales, long-term debt financing and common equity financing likely put pressure on firms to increase their short-term debt financing in 2008.

Although the financial crisis likely played a significant role in the changes in financing noted above it is also possible that the simultaneous recession also played a role. In the following analysis I seek to disentangle the effects of the financial crisis and recession and determine how much each contributed to the change in short-term debt financing just documented. In a typical recession (one not associated with a financial crisis), the recession typically affects firm profitability, growth opportunities and research and development expenditures. To account for these and other potential effects of a recession on short-term debt financing a regression analysis will be employed using MSDR as the dependent variable. The regression analysis will employ data for the sample firms for all years (2005 through 2010). The following variables will be used as explanatory variables. As larger firms have been found to employ more debt in their capital structures, the natural log of total assets (Assets) is used as a size proxy. It is believed that larger firms have better access to credit markets and, consequently, use more debt financing in their capital structures. The profitability measure used is earnings before interest and taxes divided by total assets (EBIT). Firm profits have been shown to be inversely related to the amount of debt capital a firm employs. More profitable firms are thought to have less need for outside debt financing. Net property, plant and equipment divided by total assets (PPE) is used to proxy for the quantity of tangible assets that a firm owns. More tangible assets are associated with a greater use of debt financing. It is believed that tangible assets provide better collateral for firm borrowings and, consequently, firms with more tangible assets can borrow more. Depreciation and amortization expense divided by total assets (Depr) is used to measure the quantity of non-debt tax shields the firm has available. The level of depreciation and amortization expense is inversely correlated with the amount of debt in a firm's capital structure. Theoretically, non-debt tax shields should reduce the amount of debt financing that a firm employs because they reduce the interest tax shields the debt will generate.

The market-to-book ratio (M/B) is used to measure company investment opportunities. Higher market-to-book ratios should indicate more and/or more profitable investment opportunities. The market to book ratio is calculated as total assets less book value of common equity plus market value of common equity divided by total assets. Firms with higher market-to-book ratios generally employ less debt in their capital structures. It is believed that firms with more investment opportunities have less debt in their capital structure because lenders consider investment opportunities to have little collateral value. Assets uniqueness is measured by research and development expense divided by total assets (R&D). The more R&D expense a firm has the less debt they usually have in their capital structures. Unique assets are thought to have lower collateral values and, therefore, support lower debt levels. For a more detailed discussion of these variables and how they affect a firm's debt financing see Fama and French (2002) and Flannery and Rangan (2006). It is assumed that the effect of a recession on firm short-term debt financing will be captured by the above explanatory variables. Consequently, the effects of the financial crisis on short-term debt financing should be captured by the following annual dummy variables which will be included as additional explanatory variables in the regression analysis. The dummy variables D06 through D10 take on a value of 1 in the indicated year and zero, otherwise. For example, D08 takes a value of one in 2008 and zero in all other years. The coefficient of D08 should capture the effect of the financial crisis on a firm's short-term debt financing in 2008.

The results of the regression analysis are as follows:

$$\text{MSDR} = .012 - .001^{**} \text{Assets} + .001^{*} \text{EBIT} - .006 \text{Depr} - .004^{**} \text{R\&D} + .001^{*} \text{M/B} + .004^{**} \text{PPE} - .001 \text{D06} + .002 \text{D07} + .012^{**} \text{D08} + .004^{**} \text{D09} + .001 \text{D10}$$

The coefficients of five of the six traditional (non-dummy) explanatory variables have coefficients that are significant at the 5% (*) or 1% (**) level. This indicates that these variables are effective at explaining the amount of short-term debt financing that a firm employs and should capture the effect of the recession on MSDR. The coefficients of the dummy variables for 2006, 2007 and 2010 (D06, D07 and D10) are all statistically insignificant. This suggests that the traditional explanatory variables do a good job predicting the amount of short-term debt financing that a firm will employ in non-financial crisis years. The coefficient of the dummy variable for 2008 (D08) is positive and significant at the 1% level. Its value implies that the financial crisis caused firms, on average, to employ 1.2% more short-term debt financing than they normally would have. This exceeds the .9% increase in mean MSDR observed between 2006 and 2008 and suggests that the financial crisis caused most, if not all, of the increased short-term debt financing employed in 2008. Correspondingly, the recession that occurred simultaneously with the financial crisis seems to have had little effect on firm short-term debt financing. The coefficient of the 2009 dummy variable (D09) is also positive and significant at the 1% level. The coefficient's value of .004 is much smaller than the coefficient on the 2008 dummy variable (.012) suggesting that the effect of the financial crisis began to wane markedly in 2009. Overall, the results of the regression analysis confirm the previous findings that the financial crisis caused firms to significantly increase the amount of short-term debt financing they employed in 2008 and that this effect of the financial crisis was completely reversed by the end of 2009.

4. Conclusion

The financial crisis of the late 2000s had a large effect on the capital and lending markets in the United States and overseas. The data presented here show that the financial crisis caused firms to increase the amount of short-term debt they employed from 1.3% of assets in 2006 to 2.2% in 2008. This increase in short-term debt financing was completely reversed by the end of 2009 suggesting that the increase in short-term debt financing was undesired and was reversed as soon as the financial crisis abated. The proximate causes of the spike in short-term debt financing include a reduction in accounts payable financing from suppliers and a decline in long-term debt and equity financing. A significant decrease in asset sales also contributed to the need for more short-term debt financing. A regression analysis indicated that almost all of the increase in short-term debt financing was caused by the financial crisis and not the simultaneous recession.

Table 1

Mean Values of Selected Variables

	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>
MSDR	.013	.013	.014	.022	.015	.013
BSDR	.019	.019	.019	.022	.018	.017
Current Liabilities	787	868	1,015	1,063	1,078	1,220
Acct. Pay.	290	309	357	336	366	427
Short-term Debt	106	99	132	133	96	102
Current Assets	1,076	1,186	1,340	1,382	1,533	1,710
Cash	358	361	410	413	545	619
Acct. Rec.	549	537	637	606	627	693
Inventories	264	294	333	339	346	386
Long-term Debt	675	710	875	933	1,098	1,152
Common Equity	1,377	1,574	1,780	1,763	2,027	2,306
Asset Sales	169	167	199	148	152	198

All values are in \$ million except for MSDR and BSDR.

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