The Financial Soundness of US Firms 1926-2011: Financial Frictions and Business Cycles

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1 Long Abstract

We address the role of financial frictions in US business cycles. We argue that firms' "financial soundness" is a useful state variable for measuring the current and historical impact of financial frictions on firms' investment, employment, and financing decisions. We define a measure of "soundness" to be a measure which jointly describes both *leverage* (how much a firm's assets are worth relative to its liabilities), and *risk* (how large is this capital cushion relative to the risk of the assets). We develop a new measure of financial soundness which relies only on equity return data, and we examine the history of US firms' financial soundness from 1926 to 2010 using our measure. We find that firms' financial soundness during September and October of 2008 hit a low not seen since the 1930's, supporting chairman Bernanke's view that this recession was different than other modern downturns. Importantly, we show that most of the decline in financial soundness was due to an increase in asset risk, and not to an increase in leverage. This finding has important implications since both traditional models of the impact of financial frictions on the macroeconomy, as well as recent models of intermediary capital, emphasize the role of leverage alone. What matters for managerial decisions is a more comprehensive measure of "leverage" which incorporates risk, namely, the firms' distance to insolvency. When this distance is low, either because leverage is or volatility is high, the firm's equity

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cushion is smaller, bankruptcy costs are more likely, debt overhang is more severe, and risk shifting is more likely.

Our measure is derived from structural models of credit risk, but is simple to understand and to calculate, is robust to changes in the details of the structural model, and does not require any accounting data. In particular, we derive bounds on a firms' "distance to default" and "distance to insolvency" using market equity data alone. This is useful, since debt markets are illiquid and accounting data on leverage may be slow moving. Using models based either on Merton (1974) and Black and Scholes (1973), or on Leland (1994), we show that a lower bound on a firm's distance to default, and an upper bound on its distance to insolvency, is given by the inverse of the volatility of the log equity value. Thus, our measure can be computed for a very large sample of US and international banks, and as far back as the great depression. We show how tight this bound is depending on the model specification and the input parameters. We then compute our measure for banks, financial firms, and non-financial firms back to 1926. We show that our measure is correlated with empirical default rates, and compare it to the closely related measure of distance to default developed by Moody's KMV, and to credit ratings.

Using data on US non-financial and financial firms' daily equity returns from 1926-2010, we establish the following three main stylized facts: First, we find that the distribution of financial soundness across publicly traded firms deteriorated in a very significant manner in three recessions: the two recessions of the Great Depression, 1932-33 and 1937, as well as the recent recession of 2008. Basically, in these three recessions, financial soundness for almost all publicly traded firms deteriorated to a level usually associated with a junk credit rating status. In contrast, we find that there are not significant movements in the distribution of financial soundness across firms in other recessions outside of these three, even including the deep recessions of the late 1970's and early 1980's. Thus, the collapse of the distribution of financial soundness across firms in these three recessions is very distinctive and is not characteristic of other recessions.

Second, we find that the timing and magnitude of the deterioration in the distribution of financial soundness for financial firms in 1932-33, 1937, and 2008 is almost exactly the same as for all firms, both financial and non-financial. There is no sense during these three crisis episodes that the financial soundness of financial firms deteriorated first, or that it deteriorated by more. Instead, the collapse in the distribution of financial soundness across financial and non-financial firms in these episodes was simultaneous and of comparable magnitude. Our findings indicate that the transmission of a financial crisis to the real economy (if that is the direction of causation) occurs immediately. This empiri-

cal finding may be consistent with theories such as those put forward recently by He and Krishnamurthy (2010), Brunnermeir and Sannikov (2012) and Rampini and Viswanathan (2012) in which a deterioration in the financial soundness of financial intermediaries leads to a sudden change in the pricing of capital for all firms. Such a change in pricing might lead us to measure a simultaneous deterioration in the financial soundness of non-financial firms. Alternatively, our findings may also be consistent with the models of Gabaix (2012) and Gourio (forthcoming) in which financial crisis and the recessions that accompany them are not caused by issues specific to financial intermediaries but instead are driven by time-varying disaster risk. It is very important to distinguish between these two hypotheses if we are to design regulation and policy to deal with recessions involving a substantial deterioration in the financial soundness of a broad cross-section of firms such as those of 1932-33, 1937, and 2008.

Finally, to examine the role of changes in asset volatility in the most recent financial crisis, we use our measure of financial soundness together with accounting data on leverage by firm to decompose the collapse in the distribution of financial soundness across firms that occurred in the fall of 2008 into a component that was due only to an increase in asset volatility and a residual due to leverage. We find that the major portion of the collapse in the distribution of financial soundness that occurred in 2008 was due to an increase in asset volatility. This finding stands in contrast to the assumption in most macroeconomic theories of financial frictions cited above that it is an increase in firms' leverage due to a decline in asset values that leads to financial crises. Our preliminary empirical work thus suggests that measures of leverage and a measure of financial soundness that adjusts for volatility behave very differently over time and that it is important to account for changes in business risk over and above changes in leverage to understand financial crises.