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The impact of liquidity crises on cash flow sensitivities

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ABSTRACT

We examine the relationship between liquidity crises and frictions in raising funds, and find that both the gap between the cash flow sensitivities of financially healthy and weak firms and the cash flow sensitivities of healthy and weak firms themselves are positively correlated with the severity of liquidity crises. Using a multi-equation model of cash flow sensitivities, we find that moderate liquidity crises mostly affect firms' financing activities. The recent financial crisis was especially severe for financially weak firms and curtailed both their investment and financing decisions. Financially healthy firms were able to protect their investments by maintaining financial flexibility.

1. Introduction

In their seminal study, Fazzari, Hubbard, and Petersen (1988) use investment-cash flow sensitivities to show that financially weak firms experience more difficulty raising external funds than financially healthy firms.[1] They interpret this as evidence that financially weak firms face frictions in accessing capital markets. We refer to this approach for detecting capital market constraints as the "traditional" test. All subsequent studies essentially use Fazzari et al.'s (1988) single-equation model, which regresses capital expenditures on cash flows (along with some control variables). A statistically significant and positive coefficient on cash flow is interpreted as evidence of constrained access to capital markets. The single-equation approach posits that, if a firm cuts its investments in response to a cash flow shortfall, it must be because it is unable to raise sufficient external funds to compensate for the shortfall, and is thus financially constrained.

Our primary aim in this article is to examine whether firms' constraints in accessing capital markets vary with the macroeconomic environment. In particular, we expect liquidity crises to have adverse effects on firms' abilities to raise funds. Against the backdrop that previous studies used pooled data that covered different liquidity environments, we make several contributions to the literature on capital market access constraints.

First, because pooled data may mask differences in how firms behave under different liquidity-related economic states, we estimate our model separately during non-crisis periods, during the relatively moderate liquidity crises prior to 2007, and during the recent 2007–2009 financial crisis (or subprime mortgage crisis). We then explore whether the traditional measure of capital market frictions – the cash flow sensitivity differences between financially weak and healthy firms – increases with the severity of liquidity crises.

Second, to get a complete understanding of the correlation between liquidity conditions and the size of the hurdles firms face in raising funds, we estimate cash flow sensitivities separately during non-crisis and liquidity crisis periods, and then compare the two sets of estimates to assess whether capital market frictions increase

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[1] In this study, we use the terms "financially weak" and "financially healthy" rather than "constrained" and "unconstrained," which are used in the earlier literature. This is because "constraint" would then be used in three different contexts, which we believe is overly confusing: (1) as above, to denote a firm's overall health, (2) to denote the level of access to capital markets, and (3) the sense that we also estimate our model subject to some constraints.

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with the severity of liquidity crises. We hypothesize that financially weak firms will be affected more than healthy firms during liquidity crises, and evaluate the differences in cash flow sensitivities between non-crisis and liquidity crisis periods separately for financially weak and healthy firms. These extensions of the traditional test enable us to assess how crisis severity impacts the constraints in accessing capital markets.

Third, capital market frictions impose costs on firms by creating distortions in their financial decisions, e.g., in the form of underinvestment problems.[2] The traditional metric for detecting capital market constraints only indicates to what extent weak firms operate suboptimally relative to healthy firms. If the cash flow sensitivities of both financially weak and healthy firms increase during liquidity crises, but the gap between the cash flow sensitivities remains the same, the traditional measure for financial constraints indicates no change in frictions. In contrast, we interpret the sum of the changes in the cash flow sensitivities from normal times to crisis periods faced by financially weak and healthy firms as the total costs of liquidity crises for the economy.

Fourth, both survey (Campello, Graham, & Harvey, 2010; Campello, Giambona, Graham, & Harvey, 2011) and empirical studies (Duchin, Ozbas, & Sensoy, 2010; Ivashina & Scharfstein, 2010; Almeida, Campello, Laranjeira, & Weisbenner, 2011; Bliss, Cheng, & Denis, 2013) show evidence that the subprime mortgage crisis was unusually severe. If cash flow sensitivities are a legitimate measure of the severity of liquidity crises, they should reflect firms' increased difficulties in raising funds via debt and equity offerings during the recent financial crisis. Having this crisis in our sample offers an ideal case for testing whether it was unusually severe in terms of measures of capital market access constraints.

Finally, while almost all prior studies in the literature use Fazzari et al. 's (1988) single-equation model, we implement the multi-equation cash flow sensitivity model of Gatchev, Pulvino, and Tarhan (2010). During a severe crisis, adverse effects are unlikely to be confined to firms' investment decisions. They may also affect their financing and shareholder distribution decisions. Since the Gatchev et al. (2010) model includes all the important investment, financing, and shareholder payout variables, we can provide a comprehensive description of how firms particularly coped with the recent financial crisis.

A large strand of literature that follows Fazzari et al.'s (1988) approach has confirmed their findings, and concurs that financially weak firms exhibit higher investment-cash flow sensitivities than healthy firms (Gilchrist & Himmelberg, 1995; Allayannis & Mozumdar, 2004; among others). However, other studies find evidence to the contrary, and show a non-monotonic relationship between investment cash flow sensitivities and financial constraints (Kaplan & Zingales, 1997; Kadapakkam, Kumar, & Riddick, 1998; Cleary, 1999).[3] One explanation for these conflicting results may be that the presence and extent of financial constraints are not directly observable (Moyen, 2004; Becchetti, Castelli, & Hasan, 2010). Different studies use different proxies for financial constraints, and potentially estimate cash flow sensitivities differently. Another possible explanation is that Tobin's q may be estimated with error, implying that investments are sensitive to cash flows because cash flows reflect growth opportunities rather than financial constraints (Erickson & Whited, 2000; Roberts & Whited, 2012).

Brown and Petersen (2009) extend the single-equation framework along two dimensions. First, they assume adjustment costs in investments, and include lagged investments in their model. Second, they add a variable that captures the amount of firms' external financing.[4] Bond and Söderbom (2013) use simulated data to show that in a constrained regime the sensitivity of investment to cash flow conditional on measures of Tobin's q increases monotonically with the cost for external financing. McLean and Zhao (2014) find that the investment-cash flow sensitivity declines when economic conditions improve (and external finance is less costly). They directly test the relationship between cash flows and financing variables, and find that debt and equity offering sensitivities to cash flows become more pronounced as economic conditions improve.

Our main results are as follows: first, in terms of the traditional metric, we find that firms do not face frictions in raising funds during normal times. However, even during the relatively moderate crisis periods prior to 2007, we find evidence that capital market frictions in the traditional sense exist. These frictions are detected in firms' financing decisions. In contrast, during the recent financial crisis of 2007–2009, frictions are detected in both the financing- and investment-cash flow sensitivities of financially weak firms.

Second, we detect the presence of capital market constraints in the financing-cash flow sensitivities of financially weak firms even during moderate crises. This evidence is stronger during the recent financial crisis, when we again find capital market access constraints in both investment- and financing-cash flow sensitivities of financially weak firms. The capital budgets of these firms were curtailed sharply during the subprime mortgage crisis: the size of the investment-cash flow sensitivity estimate is \$0.554 for a \$1 decline in cash flows (the highest estimate for the other subsamples is only \$0.041). This finding confirms that the recent financial crisis was an unusually severe liquidity crisis.

Third, we show evidence that capital market frictions of financially healthy firms are primarily confined to their financing-cash flow sensitivities. These firms were able to insulate their capital expenditures from the effects of the pre-2007 liquidity crises. Even during the recent financial crisis, they were able to protect 96% of their capital expenditures. It seems that the key to protecting investments is having financial flexibility in terms of unused short-term borrowing capacity and sufficient excess cash. However, although these firms are considered financially healthy, they were unable to issue long-term debt during the recent financial crisis, which supports the widely asserted observation that the capital markets "froze."

Finally, with the exception of financially weak firms during the recent financial crisis, the frictions in raising funds are not observed in the investment-cash flow sensitivities that the literature has focused on. Instead, we detect them in the cash flow sensitivities of the financing variables, primarily in the leverage variables (short- and long-term borrowings and reduction in cash holdings). Overall, we conclude that there is a strong and positive correlation between the difficulties firms face in raising funds and the presence and severity of liquidity crises.

[2] If firms are unable to fully offset decreases in cash flows by approaching capital markets (or by drawing down their cash balances), then not only are their investment activities likely to become suboptimal, but their operating, financing, and shareholder distribution activities may as well. For the sake of simplicity, most of our discussions focus on the underinvestment problem as an example of the distortions caused by capital market frictions.

[3] Moyen (2004) posits that debt financing may explain the non-monotonic relationship between investment-cash flow sensitivities and financial constraints. The effect of debt financing on investments is not captured by the single-equation model, thus it magnifies the investment-cash flow sensitivity of healthy firms. Other studies focus on firms with low or even negative cash flows and operating losses (Allayannis & Mozumdar, 2004; Bhagat, Moyen, & Suh, 2005; Cleary, Povel, & Raith, 2007) or life-cycle effects (Hovakimian, 2009). International evidence of investment-cash flow sensitivities is shown in Love (2003), Lins, Strickland, and Zenner (2005), and Francis, Hasan, Song, and Waisman (2013).

[4] Dasgupta, Noe, and Wang (2011) investigate the allocation of cash flows to alternative uses based on the cash flow identity. They find that firms' behavior is consistent with the pecking order hypothesis of Myers and Majluf (1984). In particular, firms use a \$1 cash inflow to add to cash balances and reduce external financing rather than paying out dividends or substantially increasing investments.