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J. Finan. Intermediation

journal homepage: [www.elsevier.com/locate/jfi](http://www.elsevier.com/locate/jfi)



## Which investments do firms protect? Liquidity management and real adjustments when access to finance falls sharply



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### ARTICLE INFO

#### Article history:

Received 25 September 2013

Available online 26 June 2014

#### Keywords:

Liquidity management

Value of cash

Financial flexibility

R&D

Fixed investment

Financial crisis

### ABSTRACT

We study how firms engaged in both R&D and fixed investment manage liquidity and adjust real investment during the recent financial crisis. Among firms with positive R&D expenditures, cuts to fixed investment in the crisis are typically far more severe than cuts to R&D. These firms allocate cash reserves to buffer R&D but do not use cash to protect fixed investment. Some firms appear to go so far as to allow the stock of fixed assets to fall to stabilize R&D. The use of cash holdings and fixed assets to protect R&D is particularly strong among firms most likely to face financing frictions at the start of the crisis. We only find evidence that firms use cash to buffer fixed investment when we expand the sample to include firms with no R&D spending to compete for funds. Our study provides direct evidence on the real effects of liquidity management, highlights a key benefit of precautionary cash reserves, and illustrates the adjustments firms make to navigate a financial crisis.

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## 1. Introduction

We explore how firms prioritize across competing real investments when dealing with a severe negative finance shock. Our basic idea is that protecting some investments creates more value for the firm than protecting other investments, in large part because adjustment costs differ substantially across alternative real investments. As a consequence, firms should disproportionately use their cash and liquid assets to stabilize some investments, while permitting potentially sharp reductions in others. We test these ideas by focusing on the differential treatment of R&D and fixed investment during the recent financial crisis. We focus on R&D and fixed investment because they are the primary investments for modern firms and they likely have markedly different adjustment costs.<sup>1</sup> In particular, cutting R&D investment typically entails releasing highly skilled technology workers, and reversing these cuts in the future brings about classic costs of adjustment (e.g., future hiring and training costs). In addition, firing R&D workers exacerbates appropriability problems when fired workers transmit proprietary knowledge to competitors. Since neither of these potential costs has any obvious counterpart when it comes to cuts in the rate of fixed investment, we expect firms facing a sharp decline in access to finance to buffer R&D much more aggressively than fixed investment.

We focus on firms with investment in both fixed capital and R&D in the crisis period. Though our insights extend to any time constrained firms face a firm-specific loss of access to finance, the crisis period is well-suited for testing our ideas because there is arguably a large exogenous negative shock to the availability of all forms of finance (e.g., [Bliss et al., 2013](#); [Campello et al., 2010](#); [Duchin et al., 2010](#)). During the crisis, our summary statistics show large declines in the flow of new finance, a very sharp drop in fixed investment and modest declines in R&D. Furthermore, the initial decline in cash stocks is sufficient to offset a substantial portion of the loss of internal and external finance. In addition, simple median-based tests suggest that firms responded to the negative finance shock by protecting R&D much more than fixed investment. For example, at the height of the crisis, the median within-firm annual change in R&D investment is a decline of just 2%, while the corresponding change in fixed investment is  $-25\%$ . Moreover, among the firms forced to cut both R&D and fixed investment during the crisis, an overwhelming majority (84%) cut fixed investment more than R&D (and typically the reductions in fixed investment are far larger).

To formally explore the differential buffering of R&D and fixed investment, we include changes in cash holdings in standard dynamic investment regressions. We are particularly interested in how firms spent stocks of cash holdings to buffer competing investments during the crisis.<sup>2</sup> We employ a “systems” GMM estimator which addresses the potential endogeneity of all financial variables in the regression. In the crisis period, changes in cash holdings share a very strong negative relation with R&D, particularly in the peak two years of the crisis. While there is some limited evidence in our main sample that cash holdings are used to protect fixed investment at the start of the crisis, the association between changes in cash holdings and fixed investment is far weaker (and typically insignificant) compared to the point estimates in the R&D regressions. Thus, for firms doing *both* R&D and fixed investment, our evidence suggests that firms spent much more cash protecting R&D compared to fixed investment. An additional test is motivated by the [Campello et al. \(2010, p. 471\)](#) survey evidence that “the vast majority of financially constrained firms sold assets in order to fund operations in 2008”. We find a strong negative relation between changes in the stock of fixed assets and R&D, indicating that some firms so aggressively favored R&D that they allowed the *stock* of fixed capital to fall to provide additional resources to buffer R&D. Finally, when we expand the sample to include large numbers of firms doing little or no R&D, we then find a substantial negative relation between changes in cash holdings and fixed

<sup>1</sup> While our ideas would readily extend to other investments the firm undertakes, these investments typically are either relatively unimportant (e.g., advertising expenses) or have very low or no adjustment costs (e.g., working capital). We therefore focus on the choice between R&D and fixed investment.

<sup>2</sup> Firms may also use debt capacity, derivatives and credit lines to smooth investment. However, [Almeida et al. \(2014\)](#) note that the literature on liquidity management points to cash holdings as the most important source of liquidity when it comes to downside protection. For example, [Acharya et al. \(2007\)](#) show that financially constrained firms whose financing needs arise mainly in low cash flow periods should build cash holdings as opposed to relying on spare debt capacity. In addition, in a survey of CFOs in 29 countries, [Lins et al. \(2010\)](#) conclude that cash holdings are used to buffer negative cash flow shocks while credit lines are used to undertake new investment opportunities in good times.

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