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Cash holdings, risk, and expected returns ☆

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ABSTRACT

In this paper I develop and empirically test a model that highlights how the correlation between cash flows and a source of aggregate risk affects a firm's optimal cash holding policy. In the model, riskier firms (i.e., firms with a higher correlation between cash flows and the aggregate shock) are more likely to use costly external funding to finance their growth option exercises and have higher optimal savings. This precautionary savings motive implies a positive relation between expected equity returns and cash holdings. In addition, this positive relation is stronger for firms with less valuable growth options. Using a data set of US pubic companies, I find evidence consistent with the model's predictions.

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1. Introduction

This paper studies how the correlation between cash flows and a source of aggregate risk affects the optimal cash holding policy of a firm. Using a three-period model of a firm's investing and financing decisions, I show how the riskiness of cash flows creates a novel motive for precautionary savings that is incremental to those already identified in prior studies. This additional precautionary savings motive allows me to explore the relation between cash holdings and equity returns and derive testable implications, which I verify using data on US public companies.

The model presented here extends the three-period framework of Kim, Mauer, and Sherman (1998) to allow for a source of aggregate risk. In my setup, a manager can finance investment with retained earnings or equity. Equity issuance involves pecuniary costs, such as bankers' and lawyers' fees, while savings allow the firm to avoid costly equity financing but earn a lower return than shareholders could obtain outside of the firm. The optimal cash holding policy is pinned down by the trade-off between the choice to distribute dividends in the current period or to save cash and thus avoid costly external financing in the future. Unlike Kim, Mauer, and Sherman (1998), I assume that investors are not risk-neutral. Specifically, shareholders value future cash flows using a stochastic discount factor driven by a source of aggregate

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risk. As a result, riskier firms (i.e., firms with a higher correlation between cash flows and the aggregate shock) have the highest hedging needs because they are more likely to experience a cash flow shortfall in those states in which they need external financing the most. Riskier firms' optimal savings are therefore higher than those of less risky firms.

This mechanism allows the model to produce a number of testable implications on the relation between cash holdings and expected equity returns. First, an increase in the riskiness of cash flows leads to an increase in both expected equity returns and retained earnings. In the data, a positive correlation should be observed between cash holdings and equity returns. Second, the magnitude of this correlation is larger for firms with less profitable investment opportunities. This prediction stems from the fact that, in the model, firms with less profitable investment opportunities have a smaller fraction of their total value tied to growth options and hence the expected return on these firms' assets in place has a larger weight in determining the overall expected return. As a result, a change in the riskiness of the cash flows produced by a firm's assets in place leads to a larger change in expected returns the smaller is the profitability of the firm's growth option. It follows that two firms that differ only in their future investment profitability experience the same increase in expected equity returns only if the firm with the more profitable investment opportunity experiences a larger increase in riskiness. Given that a larger increase in riskiness also causes a larger increase in cash holdings, a stronger marginal effect of expected equity returns should be observed on cash holdings across firms with more profitable growth options.

To test the model's predictions, I verify that an ex ante measure of expected returns has a significant impact on corporate cash policies. Specifically, I follow the method proposed by Gebhardt, Lee, and Swaminathan (2001) and modified by Wu and Zhang (2011) to construct an accounting-based measure for expected equity returns. Using this measure, I test whether the ex ante heterogeneity in expected equity returns is positively related to ex post differences in cash holdings, as predicted by the model. This analysis complements other studies (e.g., Opler, Pinkowitz, Stulz, and Williamson, 1999) that use cash flow volatility as a proxy for firm-level risk. The results show that changes in cash holdings from one period to the next are positively related to beginning-of-period expected equity returns. That is, firms with a higher expected equity return experience a larger increase in their cash balance. This result is robust to the inclusion of variables that control for expected cash flows and future investment opportunities, and it supports the finding of a precautionary savings motive driven by expected equity returns.

In addition, to test if the relation between expected returns and cash holdings is influenced by expected profitability, as predicted by the model, I run a subsample analysis using three different measures for the profitability of a firm's growth options. The results show that, when I use market size and current profitability as proxies, firms with higher expected profitability have a larger sensitivity of cash holdings to expected equity returns, thus confirming the model's prediction. When I use the third measure, the book-to-market ratio, the evidence is less favorable. This is not a surprise given that the book-to-market ratio is a catch-all proxy for many variables, besides future profitability.

In the second part of the empirical analysis, I perform a portfolio exercise in the spirit of Fama and French (1993) to test whether cash holdings carry a positive risk premium. I first run a simple portfolio sorting based on cash-to-asset ratios. This sorting is able to produce an equally weighted excess return of the high cash-to-assets portfolio over the low cash-to-assets portfolio that on average is positive and significant at 0.77% per month. When I use value-weighted returns, the excess return is still positive with a point estimate of 0.41% per month, but it is not significant. However, when I adjust for risk using the Fama and French (1993) or the Chen, Novy-Marx, and Zhang (2011) three-factor models, the risk-adjusted excess return of the high cash-to-assets portfolio over the low cash-to-assets portfolio is positive and significant both for equally and value-weighted excess returns. Next, I perform three independent two-way sorts on cash holdings and the same proxies for expected profitability used in the first part of the empirical analysis to verify that the cash holdings-related excess return is larger for firms with less valuable growth options. I find that, for equally weighted portfolios, the difference in the cash-related excess returns between high expected profitability firms and low expected profitability firms is positive, significant, and varying between 0.54% and 1.28% per month. As in the one-way sort case, the results are less supportive when I use value-weighted returns. In the latter case, the difference in the cash-related excess returns between high and low expected profitability firms is positive and significant only when I use the book-to-market ratio as a proxy. This leads to the conclusion that the evidence whether cash holdings carry a positive risk premium based on realized equity returns is not as strong as the one produced using the accounting-based measure for expected equity returns.

The model presented in this paper builds on the framework of Kim, Mauer, and Sherman (1998) by introducing a source of aggregate risk. In this way, the link between corporate precautionary savings and risk premia can be explicitly studied.[1] As in Kim, Mauer, and Sherman (1998), Gamba and Triantis (2008) study the interaction between cash holdings and financing constraints in a setup in which firms can both hoard cash and issue debt. They show that corporate liquidity is more valuable for small and younger firms because it allows them to improve their financial flexibility. They further show that combinations of debt and cash holdings that produce the same value of net debt have a different impact on a firm's financial flexibility. In a closely related model, Riddick and

[1] Other studies that provide a theory of optimal cash holdings are Huberman (1984), Almeida, Campello, and Weisbach (2004), Nikolov and Morellec (2009), Acharya, Almeida, and Campello (2007), Han and Qiu (2007), Asvanunt, Broadie, and Sundaseran (2010), Acharya, Davydenko, and Strebulaev (2011), and Bolton, Chen, and Wang (2011).

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