The Effects of Uncertainty and Corporate Governance on Firms' Demand for Liquidity

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- Introduction
- Literature review
- Firms' cash holding behavior and uncertainty
- Firms' cash holding behavior and agency considerations
- Modeling firms' cash holding behavior
- Empirical implementation and findings
- Conclusions

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- U.S. nonfinancial corporations hold considerable cash on their balance sheets, in excess of transactions needs
- Precautionary cash holdings may respond to uncertainty facing the firm
- Agency considerations, or the quality of corporate governance, may also affect choice of cash holdings
- These factors may have important interactions in determining the level of cash holdings

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Preview of findings

- Firms facing higher uncertainty, *cet.par.*, hold larger cash reserves
- The nature of uncertainty facing the firm—macro vs. firm-specific—matters
- Firms with more entrenched managers, *cet.par.*, hold smaller cash reserves
- The interactions of these two factors play an important role in determining the response of cash holdings to either factor and to the state of the economy
- Models ignoring such interactions are likely to produce biased results
- Recommendations on prudent risk management policy should consider both the source of uncertainty facing the firm and the incentive structure for firms' managers

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Effects of uncertainty on cash holding behavior

- Firms' holdings of cash, relative to total assets, are far in excess of transactions needs
- As many researchers have argued (Keynes, *General Theory*; Cummins & Nyman, *Fin.Res.Lett.*, 2004; Graham & Harvey, *JFE*, 2001), this reflects the precautionary demand for cash (buffer-stock), reflecting the cost of acquiring external finance in an uncertain environment
- The firm may face uncertainty at the macro, industry or firm levels
- Research identifying effects of macro and firm-level uncertainty has found that each have significant and separate effects on firms' cash holding behavior: firms increase cash/asset ratios in the face of heightened uncertainty (Baum et al., *Econ.Modelling*, 2008).
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- There are both costs and benefits to managers of holding excess cash
- Entrenched managers might hoard cash, as it enables various anti-takeover defenses and gives them more freedom of action
- On the other hand, excess cash invites proxy contests that may oust incumbent management, as Faleye (*JF*, 2004) has argued
- Harford et al. (*JFE*, 2008) show that firms with weaker corporate governance hold smaller cash reserves
- In net terms, entrenched managers may choose to hold lower cash reserves than would managers acting in shareholders' interests
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Identifying macroeconomic and idiosyncratic uncertainty

We model macroeconomic uncertainty using a GARCH(1,2) model of changes in the consumer price index (CPI) at the monthly frequency. The estimated conditional variance series, aggregated to annual frequency, is used as our proxy of macroeconomic uncertainty (σ^2_{Infl}).

We model idiosyncratic uncertainty, or firm-specific risk (σ^2_f), as the standard deviation of the closing price of the firm's shares over the last twelve months.

These measures are capturing different elements of risk, as the correlation of the idiosyncratic risk proxy with the macroeconomic uncertainty proxy is 0.035.

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Data

Our estimation sample is derived from Industrial COMPUSTAT, 1990–2007, and the Investor Responsibility Research Center (IRRC) database. We consider firms with two-digit SIC codes not equal to 49 (regulated industries), 60–69 (financial firms) and 88–99 (government enterprises). Following Gompers et al. (2003), we interpolate years missing in the IRRC database to generate an annual timeseries for each firm.

After merging the samples and dropping firm-years with missing data on the required variables, we obtain about 13,200 firm-year observations on 1,880 firms. Over the period, firms hold about 12 percent of total assets in cash on average, in line with earlier research on firms' cash holdings for the postwar period.

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Model specification

Our model is based on that of Baum et al. (*Econ.Modelling*, 2008), who formulate a two-period cash buffer-stock model in which managers choose the optimal level of liquidity in response to macroeconomic and/or idiosyncratic uncertainty. Cash holdings guard against bankruptcy when the firm faces unforeseen adverse shocks and the consequent reduced ability to borrow.

The analytical solution for optimal cash holdings posits a nonlinear function of initial resources, gross return on investment, gross borrowing rate, the distribution of cash shocks and the probability of acquiring sufficient credit when bankruptcy threatens.

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After normalizing and parameterizing as an econometric model, the specification for firm i at time t becomes

$$\left(\frac{C_{it}}{TA_{it}}\right) = \phi_0 + \phi_1\left(\frac{C_{it-1}}{TA_{it-1}}\right) + \phi_2\left(\frac{I_{it-1}}{TA_{it-1}}\right) + \phi_3\left(\frac{S_{it+1}}{TA_{it+1}}\right) +$$
$$\phi_4 Lead_{t-1} + \phi_5 TB3_{t-1} + \phi_6\hat{\psi}_{t-1} + \phi_7\hat{\sigma}^2_{f,it-1} + \phi_8\hat{\sigma}^2_{M,t-1} + \nu_{it}$$

where future sales appear from the expected returns on investment. *Lead*, the index of leading indicators, proxies for macro conditions, while *TB*3 (the three-month Treasury bill rate) captures credit market conditions. σ^2_f and σ^2_M proxy firm-specific and macroeconomic uncertainty, respectively.

We augment this specification with terms for *Gindex*, the measure of corporate governance, and its interaction with the two uncertainty proxies. We hypothesize that both uncertainty and governance factors should play a significant role in determining cash holdings.

Given the countervailing forces involved with higher cash holdings, we cannot predict the signs of coefficients relating to corporate governance and its interaction with different types of uncertainty. There are plausible explanations for positive or negative effects. We hypothesize that these effects are present as important influences on cash holdings.

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Econometric implementation and findings

We deal with the potential endogeneity of corporate governance by employing a dynamic panel data (DPD) estimation technique, System GMM, of Blundell & Bond (*J.Metrics*, 1998). The method also deals with unobserved heterogeneity at the firm level.

We present results for the coefficients of interest from three versions of our econometric model. The first introduces *Gindex* alone, for comparability with Harford et al. (2008). The second adds the idiosyncratic and macroeconomic uncertainty proxies. The third adds interaction terms between *Gindex* and the uncertainty proxies. Each equation includes a set of year dummies to capture unobserved time-varying effects.

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Models of Firms' Demand for Cash, 1989–2006

Gindex	-0.00446***	-0.000555**	-0.00598
	(-2.829)	(-2.452)	(-1.543)
$\sigma^2_{f,t-1}$		0.181**	-1.402***
		(2.056)	(-2.717)
$\sigma^2_{Infl,t-1}$		0.00520***	0.0279***
		(4.059)	(5.061)
$\sigma^2_{f,t-1} \times$ *Gindex*			0.165***
			(3.016)
$\sigma^2_{Infl,t-1} \times$ *Gindex*			-0.00260***
			(-4.623)
N of firm-years	12241	12228	12228
N of firms	1784	1781	1781
Hansen J P-value	0.4258	0.1639	0.8763
AR(1) P-value	0.0000	0.0000	0.0000
AR(2) P-value	0.1542	0.5816	0.0973

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The first estimated model shows a negative and highly significant effect of *Gindex* on cash holdings, indicating that firms with more entrenched management reduce their cash holdings, *cet.par.* When the uncertainty terms are added in the second model, *Gindex* retains its negative effect while both uncertainty proxies exhibit positive and significant coefficients, in line with earlier research.

The third model, in which interaction terms are added for *Gindex* and the uncertainty proxies, requires additional effort for its interpretation. The main effect of *Gindex* lacks significance, but both interaction terms are highly significant: that with firm-level uncertainty negative, and with macro uncertainty positive.

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In this context, the effects of *Gindex* (uncertainty) must be evaluated at a particular level of uncertainty (*Gindex*). For instance, the effect of a change in the level of uncertainty may be computed as

$$\frac{\partial(C/TA)}{\partial U} = \hat{\beta}_U + \hat{\beta}_{UG} \times G^*$$

where U is uncertainty and G is *Gindex*. These effects are most readily presented on a graph.

In Figure 1, we present point and interval estimates of the elasticity of cash holdings with respect to variations in idiosyncratic uncertainty (σ_f^2) for the range of *Gindex* values.

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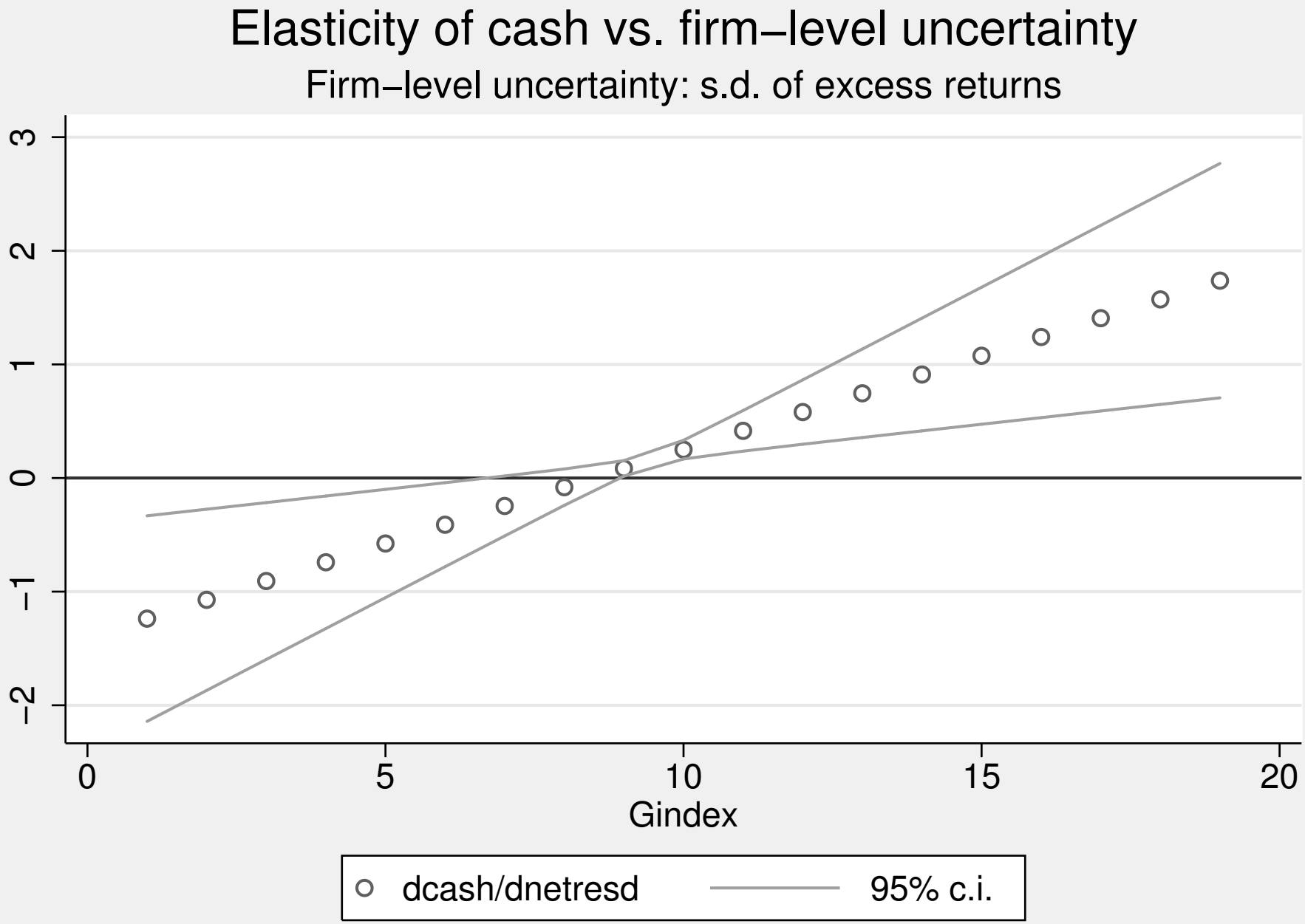
Elasticity of cash vs. firm–level uncertainty
Firm–level uncertainty: s.d. of excess returns
3
2
1
0
−1
−2
0
5
10
15
20
Gindex
dcash/dnetresd
95% c.i.

As is evident, managers of well-governed firms with low *Gindex* values respond to higher firm-specific risk by decreasing their cash buffer-stock. In contrast, managers of firms with high *Gindex* values—those facing the largest agency costs—are predicted to increase their cash buffer-stock under those conditions. In response to heightened firm risk, we predict that managers of firms with weak shareholder rights will build up their cash reserves significantly while well-governed firms reduce their cash holdings. This is consistent with the agency motives of free cash flows. An increase in firm-specific risk increases the asymmetry of information between the management and the shareholders and provides the entrenched manager an opportunity to accumulate excess cash for her own purposes. Very well-governed firms make much smaller adjustments to their cash position in this circumstance, and are predicted to reduce cash holdings by a smaller amount.

In Figure 2, we present point and interval estimates of the elasticity of cash holdings with respect to variations in macroeconomic uncertainty (σ^2_{Infl}) for the range of *Gindex* values.

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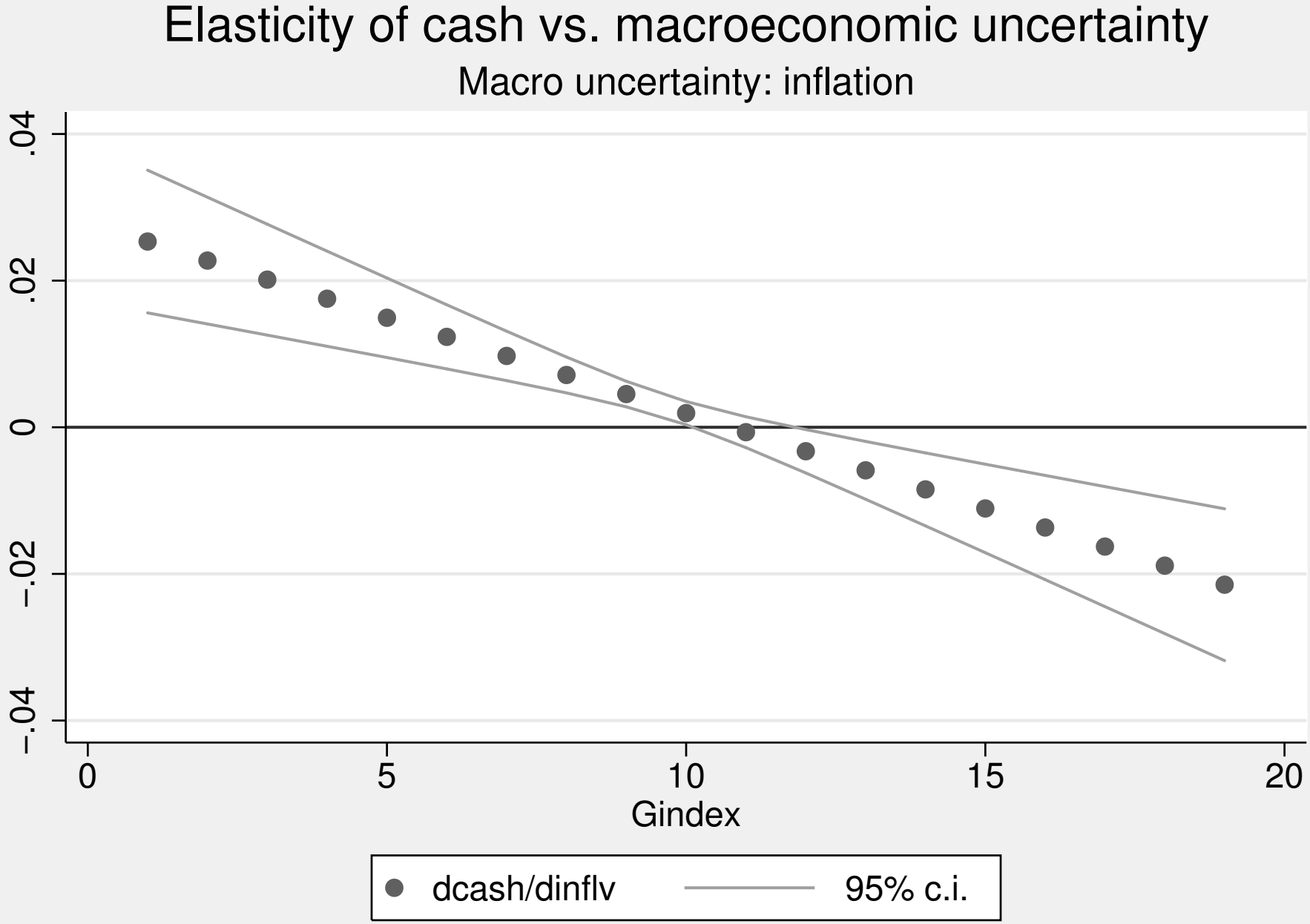
Elasticity of cash vs. macroeconomic uncertainty
Macro uncertainty: inflation
.04
.02
0
−.02
−.04
0
5
10
15
20
Gindex
dcash/dinflv
95% c.i.

In this context, firms' cash holdings are sensitive to macro uncertainty, but the direction of effect is reversed: well-governed firms increase cash holdings in response to higher macro (inflation-based) uncertainty, while entrenched managers are predicted to decrease their cash buffer-stock under those conditions. This indicates that the high-*Gindex* firms that are more protected by antitakeover provisions are predicted to lower their cash holdings in response to heightened macroeconomic uncertainty. As stated above, there is evidence that these firms enjoy lower borrowing rates, as creditors prefer them to firms that are more susceptible to takeovers. Takeovers are usually viewed as adding to stockholders' wealth at the expense of existing bondholders.

Conclusions

We consider the effects that firm-specific and macro uncertainty may exert on nonfinancial firms' cash holdings, in conjunction with a measure of the quality of corporate governance. We find that both uncertainty and governance play significant roles in determining firms' cash holdings. In addition, the effect of each factor is moderated by variations in the other factor, with the effect of either type of uncertainty having a differently-signed impact for low *Gindex* and high *Gindex* firms.

We conclude that studies of firms' cash holdings that fail to take these factors and their interactions into account may well be providing biased and inconsistent estimates of the relationship. Researchers analyzing firms' liquidity choices should take our findings into account.

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