The corporate propensity to dissave

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ABSTRACT

Extending the results of Riddick and Whited (2009), we show that firms systematically dissave from liquid assets in response to negative cash flow. This dissaving behavior is consistent with firms' rational willingness to absorb negative productivity shocks and retain assets that could become productive in the future. Dissaving behavior significantly varies with the levels of financial constraints, cash reserves, cash flow uncertainty and losses. Our evidence is obtained within the integrated regression framework, in which the cash flow identity holds implicitly, and using both OLS and q measurement-error consistent estimators. Because a large and growing fraction of U.S. firms yield negative cash flow, the corporate propensity to dissave is a systematic phenomenon.

Keywords: corporate propensity to dissave, negative cash flow, disinvestment inertia, cash flow identity, q measurement error.

JEL classification: D25, G31, G32.

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The relation between saving and cash flow remains a topic of debate in the literature. Almeida et al. (2004) model a firm's demand for liquidity (dubbed as "*the cash flow sensitivity of cash*") to gauge the cost of external finance. Riddick and Whited (2009) challenge this approach to measure finance constraints and further posit that saving and cash flow are negatively related ("*the negative propensity to save*").[1] This negative propensity occurs because a positive productivity shock causes both cash flow and the marginal product of capital to increase. A substitution effect then induces the firm to use some of its savings to acquire more productive assets, that is, to dissave and invest. In contrast, in times when a negative productivity shock causes cash flow and capital productivity to decrease, the substitution effect induces the firm to dispose some of its unproductive assets and increase savings, that is, to disinvest and save. This mechanism therefore implies that the firm counteracts movements in cash flow with opposite movements in saving.

Motivated by "the economics of inaction" (Abel and Eberly, 1993 and Stokey, 2009), we extend this mechanism and show that the firm prefers to absorb negative productivity shock by dissaving; that is, the propensity to *dissave* systematically holds when cash flow is *negative*.[2] The reason is that, in the presence of irreversibility, it is often optimal to stay in the unproductive asset and tolerate its low or negative cash flow. By doing so, the firm retains the flexibility to redeploy its assets if they become productive in the future. This decision not to proceed with the irreversible disinvestment results from the firm's ability to buffer negative cash flow with cash savings.

Specifically, we argue that the Riddick and Whited (2009)'s argument that the firm counteracts movements in cash flow with opposite movements in saving holds

[1] The flip in the sign of the cash flow coefficient is due to measurement error in Tobin's q. In the saving regression, the OLS estimator yields a positive cash flow coefficient (Almeida et al., 2004), while the measurement-error consistent estimator – a negative cash flow coefficient (Riddick and Whited, 2009).

[2] "Negative cash flow" and "cash flow loss" are synonyms in this paper.

only when the firm generates positive cash flow. Riddick and Whited do not distinguish negative cash flow realizations in their empirical tests because cash flows are predominantly positive in their sample. Hence our results are a major extension of Riddick and Whited's empirical work that focuses on negative cash flow realizations. Because a large and growing fraction of U.S. firms now yield negative cash flow, exploring firm saving/dissaving behavior in a negative cash flow environment is necessary.

Cash flow is a signal about the marginal value of liquidating vs. holding the asset in place. The classical capital budgeting theory predicts that the firm must liquidate an asset when the present value of its future cash flow is lower than the proceeds from its liquidation. In contrast, the real options theory (Dixit, 1992; Dixit and Pindyck, 1994) asserts that the firm may increase its future profit by deferring liquidation even if the present value of the asset's cash flow falls below its liquidation value. The reason is that when liquidation is at least partially irreversible, waiting to liquidate has value because new information about the future cash flow arrives in subsequent periods. This behavior results in a kind of *inertia* that has been called a 'tyranny of the status quo.' However, it is a tyranny based on rational considerations.

There is ample evidence that in many industries firms stay in unproductive assets for lengthy periods of time while absorbing large cash flow losses.[3] They rationally preserve their option to retain a foothold in the market, thereby keeping alive their option to operate profitably in the future. Shutting down operations could mean an irreversible loss of productive capital. If the market conditions become favorable and operations can be resumed profitably, the capital has to be reassembled at substantial cost. Continuing operations preserve the capital intact, and therefore the firm retains

[3]Paddock et al. (1988), Dixit (1989), O'Donogue and Rabin (1999), Eisfeldt and Rampini (2006), Bloom et al. (2007), Bloom (2009), among others. Abel and Eberly (2002) and Eisfeldt and Rampini (2006) document that, although the incidence of disinvestments occurs across industries and over cycles, the disinvestments are relatively small.

it, even at the cost of suffering temporary losses.

Contributing to disinvestment inertia is the difficulty that the firm faces in liquidating unproductive assets. First, unproductive assets are illiquid and thus cannot be quickly sold and converted into cash. Second, in a competitive setting, several firms may be trying to offload their unproductive assets, further depressing asset prices. Third, the depressed values of assets are known and about the same for other firms in the industry, so there is little gain from selling them. Therefore, the fixed costs associated with the liquidation of unproductive assets may be prohibitively high.[4]

Savings are essential for firms. They transfer funding capacity from good states to bad states of the firm. Firms with negative cash flow may have limited access to external finance and thus need to regularly tap their "savings account" to continue operations, that is, to dissave. Dissaving is thus a natural and the only possible response to negative cash flow shocks.[5]

Using a large panel of U.S. firms from 1984 to 2016, we test dissaving propensities via OLS and higher-order cumulant estimators (Erickson et al., 2014). The use of cumulant estimators is recommended because measurement error in Tobin's q, which is a control variable for the marginal value of holding cash in the saving regression, can cause the cash flow coefficient bias. In our case, because the information about growth prospects contained in cash flow leads to a positive correlation between cash flow and Tobin's q, the measurement error is likely to bias the cash flow coefficient. Cumulant estimators serve as a remedy for this bias.

The proposed empirical model differs in important ways from those used in the literature. Many existing models lack a number of important uses of cash flow and

[4]The costs of disinvestment are typically greater than those of investment. Such an asymmetry in costs leads to a greater option value of waiting for firms that hold unproductive assets, compared to the option value of waiting firms face when growth opportunities are profitable and suggest investment.

[5]Credit lines are not the best all-around substitute for cash reserves. Access to credit lines is usually restricted following covenant violations, and such violations typically follow declines in firm cash flow profitability (Sufi, 2009).

thus provide an incomplete view of the firm's saving behavior. To accurately measure the firm's propensity to save/disburse funds out of cash flow, we simultaneously track all uses of cash flow, which are interrelated by the *accounting identity* in which the sum of all uses of cash flow must equal cash flow itself (Gatchev et al., 2010; Chang et al., 2014). We define cash flow and its uses using the flow-of-funds statement of Compustat so that the identity holds in our data. Then, we separately estimate six equations that describe firms' major uses of cash flow, namely, the change in cash holdings, investment, the change in working capital, dividend, net equity repurchase, and net debt reduction.

To provide additional insight to our results, we employ an approach due to Pollock (2000) to decompose cash flow into a trend (permanent) component and a cycle (transitory) component. The trend component contains information about future cash flow and is thus likely to correlate with the error terms when growth prospects are not adequately controlled. This is arguably less likely for the cycle component that contains little information about the future beyond short-term fluctuations. Hence, the coefficient for the cycle component can be reliably interpreted as an estimate of the use of cash flow.

Our study contributes to the economics of corporate liquidity. Controlling for all major uses of cash flow and q measurement error, we document that the propensity to dissave holds systematically. Firms find it optimal (i) to dissave out of positive cash flow in order to acquire more productive assets and (ii) to dissave in response to negative cash flow in order to retain currently unproductive assets that could prove to be valuable in the future. Economically, on average, firms dissave up to 38 cents out of a dollar of positive cash flow and further dissave up to 60 cents in response to a dollar of negative cash flow. The results are consistent in both OLS and error-corrected regressions and are robust to cash flow decomposition into trend and cycle components. It is important to note that our results should not be interpreted as evidence that firms *always* dissave. Instead, our results suggest that firms routinely dissave in response to cash flow realizations, both positive and negative, but save from other sources.

We further explain why our results differ from those of Riddick and Whited (2009). First, cash flows are predominantly non-negative in Riddick and Whited's model and simulations. Cash flows are non-negative arguably due to the lack of a fixed operating cost. With fixed operating and capital adjustment costs, when a negative cash flow shock occurs but is not large enough, or when fixed costs of capital adjustment are high enough, the firm should optimally use savings to respond to negative cash flow. Second, and importantly for our study, positive cash flow firms are prevalent in Riddick and Whited's sample. We show that when more negative cash flow firms are in the sample, the positive correlation between cash flow and saving dominates.

We conduct additional analysis to ensure that our baseline results are robust to an augmented model specification. The results remain largely the same when we add the lagged cash-to-assets ratio and the lagged change in cash assets to account for the dynamic nature of saving. Furthermore, we compare the dissaving propensities in the subsamples of firms with large and small negative cash flows. Although firms in both subsamples systematically dissave, those with large negative cash flow dissave significantly less. Facing large adverse productivity shocks, firms are more likely to liquidate some of their unproductive assets and thus spend less.

We test the possibility that when facing negative cash flow, firms with costly external finance dissave differently from those with the established access to external finance. Our results indicate that dissaving propensities hold for both financially constrained and unconstrained firms. However, unconstrained firms are more likely to continue to hold unproductive assets and exploit new growth opportunities. They are more prone to dissave because they find it easier to obtain external finance. In contrast, constrained firms cannot continue to hold all unproductive assets and must give up some growth opportunities. To preserve liquidity, they are more likely to spend less.

We test the possibility that firms with more uncertain cash flow dissave differently from those with more predictable cash flow. In a negative cash flow environment, the propensity to dissave holds for firms with both high and low cash flow uncertainty, though it holds significantly stronger for the latter firms. Firms that do not face a great deal of uncertainty dissave more in response to negative productivity shocks. They find it easier to absorb negative shocks. Otherwise identical firms facing a great deal of uncertainty cannot make large changes in savings in response to negative shocks.

Next, we explore the possibility that cash-rich firms dissave differently from cash-poor firms. Facing negative productivity shocks, cash-poor firms do not dissave or dissave significantly less than do cash-rich firms. Cash-poor firms cannot completely absorb negative shocks because they are liquidity constrained. Our results thus confirm the importance of cash slack for firms' dissaving propensities.

The results further suggest that the irreversibility of disinvestment proxied by the intensity of capital-in-place plays an important role in explaining dissaving propensities. Dissaving propensities are significantly greater for high capital-intensive firms because their adjustment costs are often too high to reverse promptly. We thus provide some empirical support for the irreversibility (real options) channel.

We address the question of whether firms ever respond to negative cash flow by *saving*. We find a small group of negative cash flow firms (about 10% of the total number of firm-years) that tend to save in response to negative shock. However, this propensity to save occurs under the specific condition: the size of a firm's negative cash flow must be smaller than the size of its disinvestment. In contrast, when no disinvestment occurs or when the size of disinvestment falls below the size of negative cash flow, which are by far the most common scenarios, the propensity to dissave becomes evident.

Finally, we control for the alternative explanation for the firm's propensity to dissave based on the agency problem argument. Although managerial agency costs may have some explanatory power, dissaving propensities are likely driven by rational value considerations rather than merely by private rent-seeking interests.

To conclude, it is vital to shed light on the relation between cash saving and the sign of cash flow. In our sample, there are 23% of observations with negative cash flow. In the Compustat universe, this number is about 25%. In light of the study by Denis and McKeon (2021), who document that a large fraction of U.S. firms yield cash flow losses and hold large cash balances to sustain these losses, our evidence is both relevant and informative. Also, while the literature on cash policy long ago suggested that buffering against cash flow shortfalls could be a reason why firms hold excessive cash, none of the papers analyzed the effect of negative cash flow on saving/dissaving propensities.[6]

The paper is structured as follows. Section I describes the data, variables and empirical strategy. In section II, we report the outcome of our hypothesis tests. Section III concludes.

[6]Opler (1999), Gorbenko and Strebulaev (2010), Lins et al. (2010), Bolton et al. (2011), Gao et al. (2013), Harford et al. (2014), Vadilyev (2020), among others.

I. Data, variables and empirical strategy

A. Regression model and cash flow identity

Following Gatchev et al. (2010) and Chang et al. (2014), we build upon the following cash flow (accounting) identity defined using flow-of-funds data:

$$CF = \Delta Cash + Inv + \Delta WC + Div - \Delta D - \Delta E, \tag{1}$$

where the change in cash holdings ($\Delta Cash$), investment (Inv), the change in working capital (ΔWC), and cash dividends (Div) are the uses of funds. The sources of funds include cash flow (CF), the net debt issuance (ΔD), and the net equity issuance (ΔE). For investment, working capital, payout, issuance and repurchase activities, we consider those that are associated with actual cash inflow/outflow. The activities generating no cash flow to the firm are excluded from analysis. **Table I** describes how the regression variables are constructed from Compustat definitions. All flow-of-funds variables are scaled by total assets.

In our baseline empirical model, we regress the change in cash holdings (saving) on cash flow (CF), the market-to-book ratio (q), and firm size ($Size$). This saving model resembles that by Riddick and Whited (2009). We then create the indicator variable NEG, which is equal to unity if the firm has a negative cash flow in year t, and zero otherwise. Its cross-product terms with cash flow, $CF * NEG$ and $CF * (1 - NEG)$, determine how firms' propensities to save/dissave vary with the sign of cash flow. This augmented model allows us to test whether firms' saving/dissaving behavior changes in differing cash flow environment.[7] We include firm (f_i) and year (f_t) fixed

[7] We study how the correlation between saving and cash flow varies with the sign of cash flow. It is however possible that the sign of cash flow also affects q and $Size$. To control for this possibility, we run the regressions separately in the subsamples of positive and negative cash flows. **Appendix C** reports the results.

effects to control for unobserved firm heterogeneity and time effects, respectively. The main regression equation of interest is therefore written as follows:

$$\Delta Cash_{it} = \alpha^{\Delta Cash}(CF_{it} * NEG_{it}) + \beta^{\Delta Cash} CF_{it} * (1 - NEG_{it}) \\ + \gamma^{\Delta Cash} q_{it} + \delta^{\Delta Cash} Size_{it} + f_i + f_t + \epsilon_{it}^{\Delta Cash} \quad (2)$$

Transforming the observations for each firm into deviations from the firm-specific average is a remedy for biases caused by the correlation between firm fixed effects and regressors. However, within transformation may cause the identification condition to be violated in the q measurement-error consistent methodology (discussed in the following section). Thus, we use data in both the level and the within-transformation forms.

Appendix A discusses the system of regression equations that provides a complete view of cash flow allocations. The results reported in this appendix confirm that the cash flow identity in Eq.(1) holds in our data. It is worth noting that the OLS estimates of cash flow must always satisfy the identity, whereas the cumulant estimates (unreported) often violate the identity. The upshot is that while the OLS estimators offer economically meaningful estimates of the cash flow allocation across various uses, the cumulant estimators offer measurement error-consistent estimates.

B. Q measurement-error consistent methodology

In addition to OLS, we estimate our saving model in Eq.(2) by linear errors-in-variables regression with identification from higher-order cumulants. In this, we follow Erickson et al. (2014), who developed the q measurement-error remedy that is asymptotically equivalent to the moment estimators in Erickson and Whited (2000, 2002). This method obtains consistent estimates of slope coefficients in the presence of measurement error. Specifically, we consider estimation of a linear model with multiple mismeasured and perfectly measured regressors:

$$Y_i = X_i\beta + Z_i\alpha + \mu_i \tag{3}$$

$$x_i = X_i + \epsilon_i, \tag{4}$$

in which Y_i is the dependent variable, X_i is a vector of unobservable regressors, Z_i is a vector of perfectly measured regressors, and μ_i is the disturbance. x_i is the proxy for X_i, and ϵ_i is the measurement error. In our case, X_i is the unobservable marginal q, and x_i is the average or empirical Tobin's q. By substituting Eq.(4) into (3), we have $Y_i = x_i\beta + Z_i\alpha + \nu_i$, in which $\nu_i = \mu_i - \beta\epsilon_i$. The correlation between x_i and ν_i causes the estimate of β to be biased *downward.* If there is a positive correlation between the mismeasured q and the perfectly measured regressor α (cash flow), the attenuation bias causes the coefficient of the cash flow regressor to be biased *upward.*

To control for the q measurement error, the errors-in-variables regression can implement either the cumulant estimators or the moment estimators. Both estimators are asymptotically equivalent, but the cumulant estimators are an advance beyond the moment estimators. Overidentified moment estimators require a numerical minimization when computing a nonlinear objective function and starting values for this minimization, but cumulant estimators are linear and have a closed-form solution.[8] This feature of cumulants eliminates the selection of the starting values, which is important, given the sensitivity of moments to starting values documented in Erickson and Whited (2012). Hence, using high-order moment estimators adds a level of complexity absent from cumulant estimators and is thus not advised.

[8]The estimating equations are linear in the third and higher-order cumulants of the joint distribution of the regressors. Because these estimators do not require any information beyond that contained in the regressors, they are practical to implement. However, because third and higher-order cumulants equal zero for normal distributions, the estimators require non-normality of the mismeasured regressor (q).

The number of order is an empirical choice. Generally, the more data one has, the higher the order one can use. The minimum value is three, which corresponds to an exactly identified estimator. We use orders of three to five in all our regressions.

The R^2 of the regression (Rho) and the R^2 of measurement equation (Tau), which is an index of measurement quality, are reported. The Tau index ranges between zero and one, with zero indicating a worthless empirical proxy and one indicating a perfect proxy. Low proxy quality (below 0.5) is expected in the saving regression model, where measurement error typically stems from the large conceptual gap between the q proxy and the underlying true variable (a firm's investment opportunities or the shadow value of holding cash).

C. Cash flow decomposition

To provide additional insights and robustness to our evidence, we decompose cash flow into trend (permanent) and cycle (transitory) components. Specifically, we apply a method described in Pollock (2000), which is a variation of the Butterworth filter (Butterworth, 1930; henceforth BW) tailored toward economic applications. The BW filter separates a time-series y_t into trend τ_t and cyclical c_t components:

$$y_t = \tau_t + c_t, \tag{5}$$

in which $t = 1, ..., T-1$ and $c_t \sim N(0, \sigma^2)$. τ_t may be nonstationary. It may contain a deterministic or stochastic trend. BW filter initially estimates c_t, a stationary cyclical component that is driven by stochastic cycles within a specified range of periods. The trend component τ_t is simply the difference $\tau_t = y_t - c_t$.

The BW filter blocks lower-frequency stochastic cycles while passing through cycles that are at or above a specific frequency. The gain function of the filter is as close as possible to be a flat line at zero for the unwanted periods and a flat line at one for the desired periods. According to Pollock (2000), the gain function of the BW filter is given by

$$\psi(\omega) = [\{1 + \frac{tan(\omega_c/2)}{tan(\omega/2)}\}^{2m}]^{-1}, \tag{6}$$

in which m is the order of the filter, $\omega_c = 2\pi/p_h$ is the cut-off frequency, and p_h is the maximum period of stochastic cycles filtered out. Following common practice, we set p_h to 8 years in our annual data. We set the order of the filter m to 2.

The time-series is filtered in terms of zero mean, covariance stationary, and i.i.d. shocks ν_t and ϵ_t:

$$y_t = \frac{(1+L)^m}{(1-L)^m}\nu_t + \epsilon_t, \tag{7}$$

in which L is the lag operator which moves forward and backward over y_t. From this equation, Pollock (2000) shows that the optimal estimate for the cyclical component is given by

$$\mathbf{c} = \lambda\mathbf{Q}(\Omega_L + \lambda\Omega_H)^{-1}\mathbf{Q}'\mathbf{y}, \tag{8}$$

in which $\lambda = \{tan(\pi/p_h)\}^{-2m}$. The parameter λ is a function of p_h and the order of the filter m. Here Ω_L and Ω_H are symmetric Toeplitz matrices. The matrix $\mathbf{Q}'$ is a function of the coefficients in the polynomial $(1-L)^d = 1 + \delta_1 L + ... + \delta_d L^d$.

After obtaining the trend and cycle components of cash flow, we scale both components by total assets to get CF_trend and CF_cycle.

D. Data

The sample includes U.S. firms from the Compustat Industrial Annual files. The data constitute an unbalanced panel that covers 1984 to 2016. We use the flow-of-funds data to define variables in the cash flow identity. We set the starting point of our sample at 1984 since this is the year that the Compustat files start to report flow-of-funds data extensively. Dollar values are converted into 2005 constant dollars.

Following common practice, we exclude firms with SIC codes ranging from 4900 to 4999 (regulated firms), 6000 to 6999 (financial firms), and greater than 9000 (miscellaneous firms). We deal with outliers in three ways. First, we require firms to provide valid information on the regression variables used in Eq.(1) and (2). Second, we drop firm-years for which the book value of assets is below $1 million and for those with annual sales revenue below $1 million. Third, we trim the top and bottom 0.5% of the regression variables.

To ensure that the cash flow identity holds in our data, we exclude observations for which the absolute value of the difference between the left-hand and right-hand sides of Eq.(1) is greater than 1% of total assets (1,044 observations, or less than 1% of the original sample). The final sample includes 85,216 firm-years. The average number of observations per year is 2,582. Because the cumulant estimators require a great deal of data, a large number of observations is important.

E. Summary statistics

Table II reports the summary statistics for the regression variables. The average ratio of cash flow to assets is 4.4%. Negative cash flow observations constitute 22.7% of the sample, whereas positive cash flow observations - 77.3%. The average ratio of negative cash flow to assets is -4.5%, whereas the average ratio of positive cash flow to assets is 8.9%. On average, the sample firms every year increase cash holdings by 0.7% and working capital by 1.2%, invest 8.2%, pay out as dividends 0.8%, raise in equity financing 5.2%, and borrow 1.3% of total assets. The mean (median) Tobin's q is 1.91 (1.43). The mean is much larger than the median. Because the conditions require non-normality of the mismeasured regressor, this skewness is essential for identifying the slope coefficient in the measurement-error consistent estimations.

As discussed, we exclude observations for which the absolute value of the difference between the left-hand and right-hand sides of Eq.(1) is greater than 1% of assets. Thus, the cash flow identity holds in our sample, albeit not perfectly. DIF is the difference between the left-hand and right-hand sides of the cash flow identity. The mean, median, and standard deviation of DIF are 0, 0, and 0.001, respectively.

The mean of the cycle component of cash flow is close to zero, confirming its basic feature of a zero-mean stationary process. In contrast, the trend component has a mean of 7.2%, which is almost the same as the mean value of the level of cash flow in the restricted sample.[9] The untabulated correlation coefficient between the trend and cycle components, both scaled by the book value of assets, is -0.08, which is significant at the 1% level. The negative correlation coefficient between the two components confirms that the cycle component captures short-term momentum, while the trend component – a persistent shock to cash flow growth.

The untabulated pairwise correlation between $\Delta Cash$ and CF is 0.23 and significant at the 1% level. A positive correlation coefficient makes sense in that, on average, firms should save part of their cash flow and invest the rest or return it to shareholders/creditors. Also, because CF and q are positively correlated, a small downward bias in q can cause a large upward bias in the linear regression estimate of the cash flow coefficient.

[9]To ensure that the decomposition of cash flow into trend and cycle components is performed with a reasonably long time series, we restrict the full sample (85,216 firm-years) to firms with at least 15 non-consecutive years of cash flow data (53,463 firm-years) In this restricted sample, the mean CF is 0.07.

II. Hypothesis tests

A. *The corporate propensity to dissave*

Table III presents the results of a baseline saving model in Eq.(2). We report the results obtained using the OLS (column 2) and the third- through fifth-order cumulant estimators (columns 3 through 5) and using data in the level form (Panel A) and the within-transformation form (Panel B). The results returned from the cumulant estimators are sharply different from the OLS results but nearly identical to each other in the higher orders. OLS estimators produce a positive coefficient on $CF*(1-NEG)$ and a small coefficient on q, while the cumulant estimators produce a negative coefficient on $CF*(1-NEG)$ and a much larger coefficient on q. The q measurement error severely biases the OLS estimate of cash flow upward and that of q downward. Also, the cumulant estimators deliver higher estimates of the regression R^2 than does OLS, and we estimate the measurement quality of q to be quite low, approximately 27%. Controlling for the measurement bias, the propensity to dissave out of positive cash flow holds strongly in the data. Firms dissave up to 38 cents out of a dollar of cash flow. This result is consistent with that by Riddick and Whited (2009).

Importantly for our study, the coefficient estimate on $CF*NEG$ is significantly positive in all tests performed. The propensity to dissave holds strongly in a negative cash flow environment; that is, firms with negative cash flows experience a downward drift in cash holdings. Economically, firms dissave up to 60 cents in response to a dollar of negative cash flow. This result supports our hypothesis.

It is important to note here that our results should not be interpreted as evidence that firms *always* dissave. Instead, our results suggest that firms systematically dissave in response to cash flow realizations, *both* positive and negative, but save from other sources. As shown in Appendix A, firms save by cutting investment expenditures or raising new debt and equity. Recall that the accounting identity simultaneously tracks all sources and uses of cash flow, and as such it ensures that we accurately obtain the partial correlation between saving and cash flow, q and firm size held constant.

The baseline estimation results reported in Table III are drawn from unbalanced panel structures and generated using OLS and the cumulant estimators. To reconcile our results with those of Riddick and Whited (2009), we report the estimates for each cross-section of the unbalanced panel and then pool the yearly estimates via the procedure in Fama and MacBeth (1973). We obtain the yearly estimates via OLS and the moment estimators. Also, we confirm our baseline estimation results with the cash flow definition and sample period of Riddick and Whited (2009). The results are reported in **Appendix B**.

B. Why do our results differ from those of Riddick and Whited (2009)?

Here, we discuss the reason for the difference in our results compared with those of Riddick and Whited (2009). First, because cash flows are predominantly non-negative in Riddick and Whited's model and simulations, there is no explicit prediction for the effect of negative cash flow on saving/dissaving. Cash flows are non-negative arguably due to the lack of a fixed operating cost.[10] The intuition suggests that with fixed operating costs (c_f), when a negative cash flow shock occurs but is not large enough, or when fixed costs of capital adjustment are high enough, the firm should optimally use its savings to respond to negative cash flow ($zk^\theta - c_f$). This mechanism thus ensures a generally positive correlation between negative cash flow and saving. Furthermore, fixed costs of capital adjustment naturally introduce an

[10]The profit function is defined as $\pi(k, z) = zk^\theta$, in which k is capital asset, z – productivity shock, and θ – the curvature of the profit function (pp.1733-1736).

inaction region in which the firm does not immediately liquidate capital in response to negative cash flow. The firm finds it optimal to liquidate in two instances only: (i) large negative cash flow shocks (we discuss it in Section II.E) and (ii) small fixed costs of capital adjustment in the disinvestment process (which is empirically rare because the fixed costs associated with the disinvestment of unproductive assets are usually prohibitively high).

Second, and importantly for our study, positive cash flow firms are prevalent in Riddick and Whited's sample. In their U.S. sample, the mean (median) of cash flow is 0.13 (0.14). In our full sample, the mean (median) of cash flow is merely 0.04 (0.08), while in the subsample of strictly positive cash flow firms – 0.11 (0.10).[11] It is therefore evident that Riddick and Whited's average sample firm is significantly more profitable than our's.

Third, cash flow sample composition defines the correlation between cash flow and saving. **Table IV** presents the results of a baseline saving model in Eq.(2) and its modified specification with a single regressor for cash flow across several cash flow sample groups. The groups are formed from strictly positive cash flows; strictly negative cash flows; and cash flows above the 20^{th}, 15^{th}, 10^{th}, 5^{th}, and 1^{st} percentile of the distribution. To save space, we only report the results obtained using the fourth-order cumulant estimator and data in the level form. There are two main takeaways from this analysis. First, the cash flow coefficient in the saving model monotonically changes its sign (from -0.48, z = -19.4 to 0.49, z = 31.0) with the number of negative cash flow observations in the sample. When we exclude negative cash flow firms from the sample, the negative correlation between cash flow and saving dominates. However, when we retain negative cash flow firms in the sample,

[11] The definition of cash flow in Riddick and Whited (2009) is derived from income statement, while our definition – from cash flow statement. If we use their definition of cash flow, the mean (median) of the ratio of cash flow to assets remains almost unchanged at 0.03 (0.07) in our full sample. Appendix B provides more details.

the positive correlation dominates. Second, when we directly control for the sign of cash flow across all regression tests, the negative (positive) correlation is again evident between positive (negative) cash flow and saving. Therefore, because positive and negative cash flow firms yield opposite correlations with saving, the differences in cash flow sample composition explain much of the differences between our results and those in Riddick and Whited (2009).

Last, Riddick and Whited's original results – which are averaged over the years 1972 to 2006 – are relevant because the majority of U.S. firms performed well and generated positive cash flow in this sample period. Indeed, U.S. firms' profitability was notably higher in the 1970s and 1980s than in later decades. The share of firms with negative cash flow was about 4% in 1972 but 26% in 2016. The average cash flow was about 10% of assets in 1972 but below 2% in 2016. Still, a large and growing share of firms generated cash flow losses in the 1980s (about 15%), 1990s (20%), and 2000s (25%). This growth in losses must contribute to firms' dissaving propensities. To test this proposition, we split our sample into three periods of equal length (1984-1994, 1995-2005, 2006-2016) and estimate a baseline and modified saving model in each period. Two results stand out in **Table V**: (i) because positive cash flow firms dominate in the sample, the propensity to dissave out of cash inflow continues to hold in each period, and (ii) because the sample contains a large and growing number of negative cash flow firms, the propensity to dissave in response to negative cash flow remains significant in each period.[12] In sum, because of the steady growth of negative cash flows in the U.S. corporate sector, the firms' propensity to dissave is a systematic and long-lasting phenomenon.[13]

[12] Also, we estimate a first-order autoregression AR(1) of the ratio of cash flow to assets in the subsamples of firms that report positive and negative cash flows. In the subsample of positive (negative) cash flows, the autoregressive coefficient increased from 0.2 (0.3) in 1985 to 0.4 (0.7) in 2016. Therefore, negative cash flows not only increased in their frequency but also in their persistence over time.

[13] In our sample, there are two periods in which the average firm profitability dropped sharply: the 2000-2002 dotcom crash and the 2008-2009 GFC. In both periods, we observe an increase in the number

C. The corporate propensity to dissave and cash flow decomposition

Next, we decompose cash flow into a trend (permanent) and a cycle (transitory) component. **Table VI** reports the results. While the trend component contains information about future growth and is thus likely to correlate with the error term, the cycle component should be less subject to this critique. We first notice that the coefficient estimate on positive cash flow is positive in OLS and negative in error-corrected regression. We further notice that the OLS coefficient of the trend component (0.08, t = 9.0) is about a half of that of the cycle component (0.19, t = 13.3). Likewise, the cumulant estimators return a larger negative coefficient for the trend component. This result makes sense because firms invest more (thus save less or dissave more) in response to the growth information contained in the trend component. Importantly, regardless of whether we apply the cash flow decomposition or the cumulant estimator to address the q measurement error, the coefficient estimate on negative cash flow remains positive and statistically significant. Dissaving propensities continue to hold.

D. The corporate propensity to dissave and the dynamic nature of saving

Table VII continues with the results returned from an augmented saving model. We augment the baseline model in Eq.(2) by adding two predetermined control variables, namely the lagged value of the cash-to-assets ratio ($L.Cash$) and the lagged value of the change in cash holdings ($L.\Delta Cash$), to account for the dynamic nature of the saving/dissaving process. Although the lagged liquidity values expectedly affect the magnitudes of saving/dissaving propensities, their addition does not significantly

of negative cash flow firms. To test the effect of the increase in cash flow losses on firms' dissaving propensities around the GFC, we estimate dissaving propensities for the period 2008-2009 only. The estimated magnitude stands at 0.72 (z = 9.58), which is somewhat greater than that for the period 2006-2016 (as reported in Table V). This result suggests that firms tend to absorb losses and dissave in crisis periods.

change the statistical inferences drawn in this paper. Specifically, the error-corrected coefficient estimate on q is up to six times the size of its OLS estimate. The OLS estimator yields a positive coefficient on the positive cash flow variable, whereas the cumulant estimator – a negative coefficient. Both estimators consistently deliver a positive coefficient on the negative cash flow variable; that is, negative cash flow shocks cause a downward drift in cash holdings. The results continue to support our hypothesis.

E. The corporate propensity to dissave and the size of negative cash flow shock

It is natural to test the conjecture that firms with large negative cash flow dissave differently from those with small negative cash flow. Firms suffering from large losses may want to abandon some of their unproductive assets and thus spend less. This decision should manifest itself in a *lower* propensity to dissave. Conversely, firms experiencing small losses may want to continue to hold and support their unproductive assets. This decision should result in a *higher* propensity to dissave. To test this conjecture, we classify the negative cash flow in year t as a large (small) cash flow loss if it exceeds (falls below) the size of cash and tangible assets in years $t-1$ and t. The reason for this classification is that firms need to hold sufficient liquid and collateral assets to buffer against losses. Then, we introduce the dummy variable *Shock*, which is equal to unity (zero) for large (small) cash flow loss, and its interaction terms with cash flow, $CF * Shock$ and $CF * (1 - Shock)$. For the purpose of this test, we restrict our sample to firms with large and small losses only.

Table VIII reports the results, again with two panels containing estimates from using data in the level form and the within-transformation form. Two results stand out from this analysis. First, OLS and the error-corrected coefficient estimates on negative cash flow are significantly positive. Firms regularly absorb cash flow losses by dissaving. Second, the OLS coefficient estimate on $CF * Shock$ stands at 0.18 (t = 16.7), while that on $CF * (1 - Shock)$ – at 0.64 (t = 12.4). The q error-corrected coefficient estimate on $CF * Shock$ varies from 0.39 (z = 19.5) to 0.42 (z = 11.8), while that on $CF * (1 - Shock)$ – from 1.05 (z = 14.2) to 1.12 (z = 11.4). The results suggest that firms with large negative cash flow dissave significantly less than do those with small negative cash flow. Facing large adverse productivity shock, the former firms are likely to abandon or scale down some of their unproductive assets and thus spend less. This result makes sense because the option to wait is "out-of-the-money" when productivity shocks are just too negative.

F. The corporate propensity to dissave and financial constraints

We test the possibility that firms with costly external finance dissave differently from those with the established access to external finance. No perfect measure of the severity of external finance constraints exists. Still, we use two popular schemes to sort firms into financially constrained and unconstrained categories: cash payout and asset size.[14] First, financial constraints are more binding on firms not paying dividends and not returning cash to shareholders. Consequently, non-dividend-paying and non-stock-repurchasing firms are treated as financially constrained, while dividend-paying or stock-repurchasing firms – as unconstrained. The sortings are performed on an annual basis. Second, the size of the firm is often used as an indicator of the cost of raising external funds. Large and mature firms are considered to have better access to external finance than small and young firms. Consequently, firms with asset size above the 67$^{\text{th}}$ percentile (below the 33$^{\text{rd}}$ percentile) of the size distribution in year t are considered financially unconstrained (constrained).

[14] We also consider the Whited-Wu (Whited and Wu, 2006) and the Hadlock-Pierce (Hadlock and Pierce, 2010) indices. The untabulated results are qualitatively similar to those reported here.

We report the results in **Table IX**. In OLS, the set of constrained firms displays a stronger response of saving to positive cash flow than does the set of unconstrained firms. The OLS coefficient estimate on cash flow varies between 0.14 (t = 13.7) and 0.24 (t = 12.6) for constrained firms, while it varies between 0.01 (t = 0.2) and 0.12 (t = 6.9) for unconstrained firms. The difference between the two sets of firms is significant at better than the 1% level. When we apply the cumulant estimators, the set of constrained firms displays a weaker response of dissaving to positive cash flow than does the set of unconstrained firms. The error-corrected cash flow coefficient varies between -0.09 (z = -3.0) and -0.26 (z = -11.7) for constrained firms, while it varies between -0.48 (z = -12.7) and -0.53 (z = -17.4) for unconstrained firms. The difference between the two sets is significant at better than the 1% level. This result is similar to that in OLS inasmuch as the cash flow coefficient for constrained firms exceeds that for unconstrained firms. The error-corrected coefficient is simply shifted down from its inflated counterpart in OLS.

Importantly, the estimated coefficient on negative cash flow is positive. The OLS coefficient varies between 0.17 (t = 4.8) and 0.34 (t = 10.9), while the error-corrected coefficient – between 0.38 (z = 7.7) and 0.66 (z = 26.0). The propensity to dissave holds for both financially constrained and unconstrained firms. The coefficient for unconstrained firms is somewhat (but not always significantly) larger than that for constrained firms. This result may suggest that when facing negative cash flow, unconstrained firms are more likely to continue to hold unproductive assets and exploit new growth opportunities. They are more prone to dissave because they find it easier to obtain external finance. In contrast, constrained firms cannot continue to hold all unproductive assets and must give up some growth opportunities. To preserve liquidity, they find it necessary to liquidate some of their unproductive assets and thus spend less.

G. The corporate propensity to dissave and cash flow uncertainty

Here, we test the possibility that firms with uncertain cash flow dissave differently from those with predictable cash flow. To differentiate sample firms according to the degree of cash flow uncertainty, we estimate the standard deviation of the residuals from a first-order AR(1) autoregression of cash flow by firm. Firms with the standard deviation of the residuals in the top (bottom) third of the distribution are considered as having high (low) uncertainty.

Table X reports the estimation results. The high uncertainty group has a cash flow coefficient that is statistically different from both zero and the coefficient in the low uncertainty group. The OLS coefficient on positive cash flow ranges from 0.14 (t = 11.3) to 0.19 (t = 11.3) in the high uncertainty group, while it ranges from -0.01 (t = -0.6) to 0.01 (t = 0.5) in the low uncertainty group. The difference between the two groups is significant at better than the 1% level. The error-corrected coefficient on positive cash flow ranges from -0.17 (z = -5.6) to -0.18 (z = -6.6) in the high uncertainty group, while it ranges from -0.81 (z = -14.4) to -1.13 (z = -11.7) in the low uncertainty group. The difference is significant at better than the 1% level. Thus, saving (dissaving) propensities are greater (smaller) when cash flow uncertainty is greater. As a firm's cash flow environment becomes more uncertain, the firm becomes more willing to save (less willing to dissave) because it does not react to the smaller amount of information on productivity contained in cash flow. Also, this decrease in dissaving propensity, accompanying an increase in cash flow uncertainty, has a real option interpretation in which a greater uncertainty leads to a greater option value of holding cash.

Next, the coefficient estimate on negative cash flow is positive. The OLS coefficient varies between 0.25 (t = 28.3) and 0.39 (t = 4.7), while the error-corrected coefficient – between 0.40 (z = 26.2) and 0.84 (z = 11.8). Dissaving propensities are documented for firms with both high and low cash flow uncertainty. However, the error-corrected coefficient in the low uncertainty group is significantly larger than that in the high uncertainty group. Firms that do not face a great deal of uncertainty dissave more in response to negative cash flow shocks. They find it easier to absorb these negative shocks. Otherwise identical firms facing a great deal of uncertainty do not make large changes in savings in response to negative shocks. They simply cannot dissave as much.

H. The corporate propensity to dissave and cash reserves

We proceed to examine how dissaving propensities vary with the amount of cash available to the firm. For instance, firms with larger (smaller) cash reserves may want to dissave more (less) because they are less (more) liquidity constrained. To test this possibility, we sort our sample firms by the ratio of cash holdings to assets. Firms in the top (bottom) third of the distribution are defined as cash-rich (cash-poor). The sortings are performed on an annual basis. The mean cash-to-assets ratio for cash-rich firms is about 0.42, whereas it is only 0.02 for cash-poor firms.

The results are in **Table XI**. The most interesting finding from our point of view is that, in a negative cash flow environment, both OLS and error-corrected coefficients on $CF * NEG$ are smaller for cash-poor firms. Cash-poor firms dissave significantly less than do cash-rich firms because they are liquidity constrained and cannot completely absorb negative productivity shock. The evidence obtained here confirms the importance of cash slack in determining firms' dissaving behavior.

In unreported results, we also estimate saving/dissaving propensities in a sub-sample of firms with zero cash balances. We have 592 firm-year observations with reported zero values. Unsurprisingly, the coefficient estimates on both $CF*(1-NEG)$ and $CF * NEG$ are insignificant in all tests performed. The results again affirm the importance of cash for firms' dissaving propensities.

I. *The corporate propensity to dissave and the irreversibility of disinvestment*

It is not trivial to test the irreversibility (or real options) channel through which negative cash flow contributes to firms' dissaving propensities. One rather indirect way is to proxy the irreversibility by the intensity of a firm's non-cash productive capital and then compare the dissaving propensities between high and low capital-intensive firms. Because adjustment disinvestment costs are supposedly greater for high capital-intensive firms, dissaving propensities should also be greater.

Table XII reports the results. Sample firms are sorted by the ratio of net PPE plus balance sheet intangibles to total assets. The sortings are performed on an annual basis. We require that the ratio of net PPE plus intangibles to total assets exceeds the ratio of cash holdings to total assets.[15] Firms in the top (bottom) third of the distribution are defined as high capital-intensive (low capital-intensive). The results suggest that the irreversibility of disinvestment plays an important role in predicting dissaving propensities. In both OLS and measurement-error consistent estimations, dissaving propensities are significantly greater for high capital-intensive firms. In untabulated results, dissaving propensities estimated on an industry level exhibit similar differences. We therefore provide some empirical support for the irreversibility channel.

[15]This restriction is required to isolate the effect of cash holdings. Dissaving propensities can be high because cash holdings are high. High (low) capital-intensive firms are on average cash-poor (cash-rich). In our sample, the average ratios of cash holdings (PPE plus intangibles) to total assets are 0.07 (0.67) and 0.32 (0.12), respectively, for high and low capital-intensive firms.

J. *Do firms ever respond to negative cash flows by saving?*

Our hypothesis predicts that firms rationally tolerate negative cash flows and retain unproductive assets. To absorb negative shock to their cash flows, firms tend to use cash holdings. Our results strongly support this prediction. Still, there must be a disinvestment trigger, or the critical level of cash flow, at which it becomes optimal to liquidate unproductive assets and return the proceeds from liquidation to the "savings account." Unfortunately, we cannot directly estimate the disinvestment trigger; however, at the aggregate firm level, we can observe the size of disinvestment. According to the cash flow identity in Eq.(1), the firm must add to its "savings account" in periods when the cash *inflow* from disinvestment exceeds the cash *outflow* caused by negative income. We test this proposition.

To this end, we impose the following restrictions to the sample firms in year t: (i) negative cash flow ($CF < 0$), (ii) negative investment (disinvestment) ($Inv < 0$), and (iii) the size of disinvestment must exceed that of negative cash flow ($|Inv| > |CF|$). The resulting sample includes 1,870 observations, or nearly 10% of the total number of firm-year observations with negative cash flow. Because of a relatively small number of observations, we use only the OLS estimator to test the saving model (recall that the cumulant estimator requires a greater deal of data). As before, we tabulate the results obtained using data in the level and the within-transformation forms.

Table XIII reports the results. In the saving model, the OLS coefficient on negative cash flow is negative at a statistically significant level. That is, the firm *saves* when the size of its disinvestment *exceeds* that of its negative cash flow. However, this empirical regularity is quite rare. In contrast, when no disinvestment occurs or when the size of disinvestment falls below that of negative cash flow, which are by far the most common scenarios (over 90% of the total number of observations), the propensity to dissave dominates.

K. Alternative explanation for the corporate propensity to dissave

The possible alternative explanation for firms' dissaving propensities in response to negative cash flow is bad news withholding/agency costs. First, managers may have incentives to withhold bad news to the market (Kothari et al., 2009). If a firm decides to liquidate its troubled assets, then the market is more likely to learn about the problem the firm faces. To minimize the dissemination of bad news and to buy time until good news arrive, managers may choose to keep troubled assets. Second, managers may have incentives to overinvest, and they are likely to hold onto troubled assets to maximize their personal benefits (Jensen, 1986). This explanation suggests that when a firm with agency problems faces negative cash flow, it may be willing to deaccumulate cash reserves to hold onto troubled assets.

To control for this alternative, we use institutional equity holdings as a proxy for agency problems. We introduce an indicator variable $Inst$, which takes a value of unity if the percentage of institutional holdings ranks in the top decile in its annual distribution, and zero otherwise. Its interaction term with the cash flow variable ($CF * Inst$) shows whether outside monitoring (a larger proportion of institutional ownership) affects firms' dissaving propensities.

Table XIV reports the estimates for firms with positive and negative cash flows separately. As before, the results are returned using OLS and the high-order cumulant estimators and using data in the level and the within-transformation forms. Dissaving propensities in the negative cash flow domain continue to hold irrespective of the size of the institutional ownership stake held in the firm. Although the interaction term ($CF * Inst$) is significantly negative for positive cash flow realization, suggesting that institutional investors may want to motivate the firm to exploit profitable growth opportunities and thus dissave, it is often insignificant for negative cash flow realization. Thus, outside shareholder monitoring does not necessarily force managers to liquidate unproductive assets because managers' inertia to disinvest is likely driven by value-oriented considerations rather than merely by private rent-seeking interests.

III. Conclusion

We study the effect of negative cash flow on the firms' propensity to hold cash. Extending the original result of Riddick and Whited (2009), in which the preponderance of sample firms had positive cash flow, we find that firms absorb negative cash flow by dissaving. Firms are rationally willing to dissave to retain the flexibility to continue with temporarily unproductive assets. Dissaving propensities vary with the size of cash assets and the degrees of external finance constraints and cash flow uncertainty. Our results are robust to q measurement error, cash flow decomposition, model specification, and an alternative explanation based on the agency cost argument. We find only a small group of negative cash flow firms operating under specific conditions in which negative productivity shocks cause firms to save. To conclude, dissaving propensities systematically operate in a negative cash flow environment, and value-enhancing considerations most likely drive them.

References

[1] Abel, A., Eberly, J., 1993. A unified model of investment under uncertainty. *National Bureau of Economic Research, working paper* 4296.

[2] Abel, A., Eberly, J., 2002. Investment and q with fixed costs: an empirical analysis. *University of Pennsylvania, working paper.*

[3] Almeida, H., Campello, M., Weisbach, M., 2004. The cash flow sensitivity of cash. *Journal of Finance* 59, 1777-1804.

[4] Bloom, N., Bond, S., Van Reenen, J., 2007. Uncertainty and investment dynamics. *Review of Economic Studies* 74, 391-415.

[5] Bloom, N., 2009. The impact of uncertainty shocks. *Econometrica* 77, 623-685.

[6] Bolton, P., Chen, H., Wang, N., 2011. A Unified theory of Tobin's q, corporate investment, financing, and risk management. *Journal of Finance* 66, 1545-1578.

[7] Butterworth, S., 1930. On the theory of filter amplifiers. *Experimental Wireless and the Wireless Engineer* 7, 536-541.

[8] Chang, X., Dasgupta, S., Wong, G., Yao, J., 2014. Cash flow sensitivities and the allocation of internal cash flow. *Review of Financial Studies* 27, 3628-3657.

[9] Denis, D., McKeon, S., 2021. Persistent negative cash flows, staged financing, and the stockpiling of cash balances. *Journal of Financial Economics* 142, 293-313.

[10] Dixit, A., 1989. Entry and exit decision under uncertainty. *Journal Political Economy* 97, 620-638.

[11] Dixit, A., 1992. Investment and hysteresis. *Journal of Economic Perspectives* 6, 107-132.

[12] Dixit, A., Pindyck, R., 1994. Investment under uncertainty. *Princeton University Press.*

[13] Eisfeldt, A., Rampini, A., 2006. Capital reallocation and liquidity. *Journal of Monetary Economics* 53, 369-399.

[14] Erickson, T., Whited, T., 2000. Measurement error and the relationship between investment and q. *Journal of Political Economy* 108, 1027-1057.

[15] Erickson, T., Whited, T., 2002. Two-step GMM estimation of the errors-in-variables model using higher order moments. *Econometric Theory* 18, 776-799.

[16] Erickson, T., Whited, T., 2012. Treating measurement error in Tobin's q. *Review of Financial Studies* 25, 1286-1329.

[17] Erickson, T., Jiang, C., Whited, T., 2014. Minimum distance estimation of the errors-in-variables model using linear cumulant equations. *Journal of Econometrics* 183, 211-221.

[18] Fama, E., MacBeth, J., 1973. Risk, return, and equilibrium: Empirical tests. *Journal of Political Economy* 81, 607-636.

[19] Gao, H., Harford, J., Li, K., 2013. Determinants of corporate cash policy: insights from private firms. *Journal of Financial Economics* 109, 623-639.

[20] Gatchev, V., Pulvino, T., Tarhan, V., 2010. The interdependent and intertemporal nature of financial decisions: an application to cash flow sensitivities. *Journal of Finance* 65, 725-763.

[21] Gorbenko, A., Strebulaev, I., 2010. Temporary versus permanent shocks: explaining corporate financial policies. *Review of Financial Studies* 23, 2591-2647.

[22] Hadlock, C., Pierce, J., 2010. New evidence on measuring financial constraints: moving beyond the KZ index. *Review of Financial Studies* 23, 1909-1940.

[23] Harford, J., Klasa, S., Maxwell, W., 2014. Refinancing risk and cash holdings. *Journal of Finance* 69, 975-1012.

[24] Jensen, M., 1986. Agency costs of free cash flow, corporate finance and takeovers. *American Economic Review* 76, 323-329.

[25] Lins, K., Servaes, H., Tufano, P., 2009. What drives corporate liquidity: an international survey of cash holdings and credit lines. *Journal of Financial Economics* 98, 160-176.

[26] O'Donogue, T., Rabin, M., 1999. Doing it now or later. *American Economic Review* 89, 103-125.

[27] Opler, T., Pinkowitz, L., Stulz, R., Williamson, R., 1999. The determinants and implications of corporate cash holdings. *Journal of Financial Economics* 52, 3-46.

[28] Paddock, J., Siegel, D., Smith, J., 1988. Option valuation of claims on real assets: the case of offshore petroleum leases. *Quarterly Journal of Economics* 103, 479-508.

[29] Pollock, D., 2000. Trend estimation and de-trending via rational square-wave filters. *Journal of Econometrics* 99, 317-334.

[30] Riddick, L., Whited, T., 2009. The corporate propensity of save. *Journal of Finance* 64, 1729-1766.

[31] Stokey, N., 2009. The economics of inaction: stochastic control models with fixed costs. *Princeton University Press.*

[32] Sufi, A., 2009. Bank lines of credit in corporate finance: an empirical analysis. *Review of Financial Studies* 22, 1057-1088.

[33] Trigeorgis, L., 1996. Real option: managerial flexibility and strategy in resource allocation. *MIT Press*, Cambridge, MA.

[34] Vadilyev, A., 2020. Firms from financially developed economies do not save less. *Critical Finance Review* 9, 305-351.

[35] Whited, T., Wu, G., 2006. Financial constraint risk. *Review of Financial Studies* 19, 531-559.

Table I. Variables definitions.

Description: Variables are defined using flow-of-funds data of Compustat. The variable definitions vary according to the format code (scf) a firm follows in reporting flow-of-funds data. Effective for fiscal years ending July 15, 1988, SFAS 95 requires U.S. companies to report the Statement of Cash Flows (scf = 7). Prior to adoption of SFAS 95, companies may have reported one of the following statements: Working Capital Statement (scf = 1), Cash Statement by Source and Use of Funds (scf = 2), and Cash Statement by Activity (scf = 3). The variables include the change in cash holdings ($\Delta Cash$), cash flow (CF), investment (Inv), cash dividends (Div), the change in working capital (ΔWC), net debt issued (ΔD), and net equity issued (ΔE). We include in parentheses the Compustat XPF variable names.

Interpretation: Because the variables are defined using flow-of-funds data, the activities generating no cash flow to the firm are excluded from the analysis.

Variables	scf = 1	scf = 2	scf = 3	scf = 7
$\Delta Cash$	cash and cash equivalents increase/decrease (chech)	same as scf = 1	same as scf = 1	same as scf = 1
CF	income before extra items (ibc) + extra items & discontinued operation (xidoc) + depreciation & amortization (dpc) + deferred taxes (txdc) + equity in net loss (esubc) + gains in sale of PPE & investment (sppiv) + other funds from operation (fopo) + other sources of funds (fsrco)	same as scf = 1	same as scf = 1	income before extra items (ibc) + extra items & discontinued operation (xidoc) + depreciation & amortization (dpc) + deferred taxes (txdc) + equity in net loss (esubc) + gains in sale of PPE & investment (sppiv) + other funds from operation (fopo) + exchange rate effect (exre)
Inv	capital expenditure (capx) + increase in investment (ivch) + acquisition (aqc) + other uses of funds (fuseo) − sale of PPE (sppe) − sale of investment (siv)	same as scf = 1	same as scf = 1	capital expenditure (capx) + increase in investment (ivch) + acquisition (aqc) − sale of PPE (sppe) − sale of investment (siv) − change in short-term investment (ivstch) − other investing activities (ivaco)
Div	cash dividends (dv)	same as scf = 1	same as scf = 1	same as scf = 1
ΔWC	change in working capital (wcapc)	− change in working capital (wcapc)	same as scf = 2	− change in account receivable (recch) − change in inventory (invch) − change in account payable (apalch) − accrued income taxes (txach) − other changes in assets and liabilities (aoloch) − other financing activities (fiao)
ΔD	long-term debt issuance (dltis) − long-term debt reduction (dltr) − changes in current debt (dlcch)	long-term debt issuance (dltis) − long-term debt reduction (dltr) + changes in current debt (dlcch)	same as scf = 2	same as scf = 2
ΔE	sale of common and preferred stock (sstk) − purchase of common and preferred stock (prstkc)	same as scf = 1	same as scf = 1	same as scf = 1

Table II. Summary statistics.

Description: The sample consists of 85,216 firm-year observations jointly covered in Compustat and CRSP between 1984 and 2016. The variables include the change in cash holdings ($\Delta Cash$), cash flow (CF), investment (Inv), the change in working capital (ΔWC), cash dividends (Div), net debt issued (ΔD), net equity issued (ΔE), negative cash flow indicator (NEG), the cycle (CF_cycle) and trend (CF_trend) components of cash flow, the natural log of book assets ($Size$), and the ratio of the market value of assets to the book value of assets (q). DIF is the difference between the left-hand and right-hand sides of the cash flow identity in Eq.(1). The variables in Eq.(1) and the components of cash flow are scaled by total assets. M3 stands for skewness. All variables are trimmed at the top and bottom 0.5% of their distributions.

Interpretation: First, a large fraction of observations (about 23%) has negative cash flow. Second, the cash flow identity in Eq.(1) holds in the sample (DIF is equal to zero). Third, the mean of the cycle component of cash flow is close to zero, confirming its basic feature of a zero-mean stationary process. Fourth, the mean of the trend component (0.072) is about the same as the mean value of the level of cash flow in the cash-flow restricted sample (53,463 firm-years). Fifth, the skewness of q is important for identifying the slope coefficients in the measurement-error consistent estimation.

Variable	Obs.	Mean	St.D.	Median	M3
$\Delta Cash$	85,216	0.007	0.127	0.002	-0.07
CF	85,216	0.044	0.179	0.082	-2.57
Inv	85,216	0.082	0.134	0.058	0.42
ΔWC	85,216	0.012	0.104	0.012	-0.91
Div	85,216	0.008	0.023	0.000	5.83
ΔD	85,216	0.013	0.113	0.000	1.11
ΔE	85,216	0.052	0.165	0.001	3.36
DIF	85,216	0.000	0.001	0.000	5.99
NEG	85,216	0.227	0.419	0.000	1.30
$1-NEG$	85,216	0.773	0.419	1.000	-1.30
$CF * NEG$	85,216	-0.045	0.134	0.000	-4.49
$CF * (1-NEG)$	85,216	0.089	0.079	0.082	1.00
$CF\_cycle^{\dagger}$	53,463	-0.002	0.065	0.001	-0.47
$CF\_trend^{\dagger}$	53,463	0.072	0.125	0.087	-2.20
$Size$	85,216	4.521	2.186	4.372	0.36
q	85,216	1.907	1.385	1.429	2.25

† CF_cycle and CF_trend are estimated in the sample of firms with at least 15 non-consecutive years of cash flow data. In this restricted sample, the mean (median) CF is 0.070 (0.090).

Table III. The corporate propensity to dissave: baseline regression.

Description: The baseline saving model in Eq.(2) is estimated using OLS and the third- through fifth-order cumulant estimators. Panel A and Panel B report the results obtained using data in the level form and the within-transformation form, respectively. $\Delta Cash$ is the change in cash holdings scaled by assets. CF is cash flow scaled by assets. NEG is equal to unity if the firm has a negative cash flow in year t, and zero otherwise. $Size$ is the natural log of book assets. Tobin's q is the market value of assets divided by the book value of assets. Table I describes the regression variables. The OLS t-statistics and the cumulant z-statistics are reported in parentheses. Rho is an estimate of the R^2 of the regression. $Tau \in (0, 1)$ is an index of measurement quality for the q proxy.

Interpretation: The firms' propensity to dissave holds systematically. Firms (i) dissave out of positive cash flow (the result originated in Riddick and Whited, 2009) and (ii) dissave in response to negative cash flow (our contribution). Riddick and Whited's argument that firms counteract movements in cash flow with opposite movements in saving holds only when firms generate positive cash flow. Our argument holds when firms generate negative cash flow.

Panel A	OLS	Third	Fourth	Fifth
		Level		
$CF*(1-NEG)$	**0.08**	**-0.55**	**-0.37**	**-0.38**
	(10.8)	(-15.7)	(-20.0)	(-20.5)
$CF*NEG$	**0.24**	**0.73**	**0.59**	**0.60**
	(35.4)	(28.4)	(48.5)	(48.5)
q	0.02	0.14	0.11	0.11
	(34.9)	(24.9)	(53.2)	(56.0)
$Size$	0.00	0.00	0.00	0.00
	(-7.23)	(5.77)	(5.14)	(5.23)
Obs.	85,216	85,216	85,216	85,216
Rho	8.9%	31.4%	25.1%	25.4%
Tau	-	0.26	0.30	0.29

Panel B	OLS	Third	Fourth	Fifth
		Within-transformation		
$CF*(1-NEG)$	**0.14**	**-0.42**	**-0.32**	**-0.34**
	(12.8)	(-6.58)	(-14.2)	(-15.0)
$CF*NEG$	**0.30**	**0.47**	**0.45**	**0.45**
	(29.2)	(20.1)	(33.2)	(33.1)
q	0.02	0.15	0.13	0.13
	(22.9)	(10.6)	(36.0)	(38.2)
$Size$	0.01	0.03	0.02	0.02
	(3.78)	(8.40)	(16.5)	(16.9)
Obs.	85,216	85,216	85,216	85,216
Rho	11.4%	22.4%	20.1%	20.5%
Tau	-	0.25	0.27	0.26

Table IV. The corporate propensity to dissave: cash flow sample composition.

Description: The baseline saving model in Eq.(2) and its modified specification with a single regressor for CF are estimated (i) using the fourth-order cumulant estimator and (ii) across several sample (cash flow) groups. The groups are formed from strictly positive cash flows; strictly negative cash flows; and cash flows above the 20^{th}, 15^{th}, 10^{th}, 5^{th}, and 1^{st} percentile of the distribution. The results are obtained using data in the level form. $\Delta Cash$ is the change in cash holdings scaled by assets. CF is cash flow scaled by assets. NEG is equal to unity if the firm has a negative cash flow in year t, and zero otherwise. $Size$ is the natural log of book assets (unreported). Tobin's q is the market value of assets divided by the book value of assets. $CF\ mean$ is the mean value of cash flow to book assets. Table I describes the regression variables. The cumulant z-statistics are reported in parentheses. Rho is an estimate of the R^2 of the regression. $Tau \in (0,1)$ is an index of measurement quality for the q proxy.

Interpretation: Cash flow sample composition defines the correlation between cash flow and saving. The negative (positive) correlation between cash flow and saving dominates in positive (negative) cash flow firms. The differences in cash flow sample composition explain much of the differences between our findings and those in Riddick and Whited (2009).

	CF>0	CF>p20		CF>p15		CF>p10		CF>p5		CF>p1		CF<0
CF	**-0.48**	**-0.42**		**-0.32**		**-0.18**		**0.02**		**0.21**		**0.49**
	(-19.4)	(-18.5)		(-16.7)		(-12.0)		(1.56)		(22.8)		(31.0)
$CF * (1 - NEG)$			**-0.45**		**-0.43**		**-0.43**		**-0.41**		**-0.39**	
			(-19.1)		(-19.4)		(-20.1)		(-20.5)		(-20.3)	
$CF * NEG$			**4.28**		**1.56**		**0.99**		**0.77**		**0.65**	
			(11.7)		(18.9)		(24.5)		(32.2)		(41.2)	
q	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.11	0.11	0.11	0.11	0.11
	(39.8)	(39.8)	(40.0)	(42.7)	(42.5)	(48.9)	(46.8)	(54.8)	(50.1)	(53.6)	(51.3)	(26.4)
$CF\ mean$	0.115	0.111		0.101		0.090		0.074		0.053		-0.198
Obs.	65,853	68,173		72,434		76,695		80,956		84,364		19,363
Rho	23.3%	22.8%	22.7%	22.7%	22.5%	23.6%	22.9%	24.2%	23.0%	24.4%	23.2%	22.9%
Tau	0.27	0.27	0.27	0.24	0.26	0.21	0.27	0.17	0.26	0.16	0.28	0.34

Table V. The corporate propensity to dissave: sample periods.

Description: The baseline saving model in Eq.(2) and its modified specification with a single regressor for CF are estimated (i) using the fourth-order cumulant estimator and (ii) across three sample periods (1984-1994, 1995-2005, and 2006-2016). The results are obtained using data in the level form. $\Delta Cash$ is the change in cash holdings scaled by assets. CF is cash flow scaled by assets. NEG is equal to unity if the firm has a negative cash flow in year t, and zero otherwise. $Size$ is the natural log of book assets (unreported). Tobin's q is the market value of assets divided by the book value of assets. $CF < 0$ is the fraction of negative cash flow observations in each sample period. Table I describes the regression variables. The cumulant z-statistics are reported in parentheses. Rho is an estimate of the R^2 of the regression. $Tau \in (0, 1)$ is an index of measurement quality for the q proxy.

Interpretation: First, because positive cash flow firms dominate in the sample over time, the propensity to dissave out of cash inflow holds in each period. Second, because the sample contains a large share of negative cash flow firms in each period, the propensity to dissave in response to negative cash flow is evident over time.

	1984-1994		1995-2005		2006-2016	
CF	**0.24**		**0.26**		**0.32**	
	(14.7)		(23.6)		(20.9)	
$CF * (1 - NEG)$		**-0.39**		**-0.45**		**-0.34**
		(-10.9)		(-16.3)		(-10.6)
$CF * NEG$		**0.64**		**0.56**		**0.60**
		(22.5)		(34.8)		(26.0)
q	0.12	0.12	0.11	0.10	0.11	0.11
	(23.1)	(22.8)	(37.0)	(38.3)	(26.6)	(28.0)
$CF < 0$	19.7%		25.1%		22.8%	
Obs.	26,887		33,226		25,103	
Rho	19.9%	19.7%	30.7%	30.6%	23.5%	22.7%
Tau	0.14	0.27	0.18	0.31	0.19	0.31

Table VI. The corporate propensity to dissave: cash flow decomposition.

Description: The baseline saving model in Eq.(2) is modified and estimated using OLS and the third- through fifth-order cumulant estimators. Panel A and Panel B report the results obtained using data in the level form and the within-transformation form, respectively. $\Delta Cash$ is the change in cash holdings scaled by assets. CF is cash flow scaled by assets. NEG is equal to unity if the firm has a negative cash flow in year t, and zero otherwise. $Size$ is the natural log of total assets. Tobin's q is the market value of assets divided by the book value of assets. CF_cycle and CF_trend are the cycle and trend components of cash flow, respectively. Table I describes the regression variables. The OLS t-statistics and the cumulant z-statistics are reported in parentheses. Rho is an estimate of the R^2 of the regression. $Tau \in (0, 1)$ is an index of measurement quality for the q proxy.

Interpretation: The firms' propensity to dissave is robust but sensitive to cash flow decomposition. First, the firms' propensity to dissave systematically holds in a negative cash flow environment. Second, firms dissave more in response to the growth information contained in the trend (permanent) component. Third, firms dissave less in response to the short-term fluctuations contained in the cycle (transitory) component.

Panel A	OLS	Third	Fourth	Fifth
		Level		
$CF\_trend * (1 - NEG)$	**0.08**	**-0.76**	**-0.45**	**-0.48**
	(9.01)	(-10.2)	(-14.8)	(-15.7)
$CF\_cycle * (1 - NEG)$	**0.19**	**-0.54**	**-0.27**	**-0.30**
	(13.3)	(-8.14)	(-9.52)	(-10.3)
$CF\_trend * NEG$	**0.21**	**0.95**	**0.68**	**0.70**
	(16.3)	(14.1)	(25.9)	(26.4)
$CF\_cycle * NEG$	**0.28**	**0.63**	**0.50**	**0.51**
	(15.4)	(14.7)	(18.8)	(18.9)
q	0.01	0.15	0.10	0.10
	(20.5)	(13.8)	(30.6)	(33.1)
$Size$	0.00	0.00	0.00	0.00
	(-6.12)	(1.70)	(0.92)	(1.04)
Obs.	53,463	53,463	53,463	53,463
Rho	7.1%	27.3%	19.8%	20.5%
Tau	-	0.25	0.29	0.29

Panel B	OLS	Third	Fourth	Fifth
		Within-transformation		
$CF\_trend * (1 - NEG)$	**0.14**	**-0.69**	**-0.37**	**-0.40**
	(10.8)	(-5.46)	(-11.3)	(-12.4)
$CF\_cycle * (1 - NEG)$	**0.21**	**-0.40**	**-0.16**	**-0.18**
	(13.0)	(-4.10)	(-5.73)	(-6.50)
$CF\_trend * NEG$	**0.23**	**0.61**	**0.47**	**0.48**
	(14.6)	(8.98)	(18.5)	(18.4)
$CF\_cycle * NEG$	**0.27**	**0.43**	**0.37**	**0.38**
	(13.0)	(10.8)	(14.2)	(14.1)
q	0.01	0.18	0.12	0.12
	(14.8)	(7.37)	(25.2)	(27.9)
$Size$	0.01	0.02	0.02	0.02
	(1.96)	(6.04)	(10.8)	(11.1)
Obs.	53,463	53,463	53,463	53,463
Rho	5.2%	21.6%	16.1%	16.6%
Tau	-	0.23	0.26	0.26

Table VII. The corporate propensity to dissave: dynamic saving.

Description: The baseline saving model in Eq.(2) is modified and estimated using OLS and the third- through fifth-order cumulant estimators. Panel A and Panel B report the results obtained using data in the level form and the within-transformation form, respectively. $\Delta Cash$ is the change in cash holdings scaled by assets. CF is cash flow scaled by assets. NEG is equal to unity if the firm has a negative cash flow in year t, and zero otherwise. $Size$ is the natural log of book assets. Tobin's q is the market value of assets divided by the book value of assets. $L.Cash$ is the lagged value of the cash-to-assets ratio. $L.\Delta Cash$ is the lagged value of the change in cash assets. Table I describes the regression variables. The OLS t-statistics and the cumulant z-statistics are reported in parentheses. *Rho* is an estimate of the R^2 of the regression. $Tau \in (0, 1)$ is an index of measurement quality for the q proxy.

Interpretation: The firms' propensity to dissave is robust to the lagged size and dynamics of cash savings.

Panel A	OLS	Third	Fourth	Fifth
	Level			
$CF * (1 - NEG)$	**0.07**	**-0.30**	**-0.40**	**-0.39**
	(8.74)	(-11.3)	(-18.3)	(-18.6)
$CF * NEG$	**0.24**	**0.48**	**0.54**	**0.53**
	(30.2)	(27.3)	(39.8)	(40.4)
q	0.02	0.09	0.11	0.11
	(34.9)	(22.4)	(46.3)	(49.0)
$Size$	0.00	0.00	0.00	0.00
	(-7.21)	(0.61)	(1.38)	(1.36)
$L.\Delta Cash$	-0.14	-0.15	-0.16	-0.16
	(-21.1)	(-21.0)	(-20.5)	(-20.5)
$L.Cash$	-0.07	-0.18	-0.21	-0.21
	(-19.4)	(-21.3)	(-28.1)	(-28.6)
Obs.	67,776	67,776	67,776	67,776
Rho	13.2%	28.4%	32.3%	32.1%
Tau	-	0.39	0.36	0.36

Panel B	OLS	Third	Fourth	Fifth
	Within-transformation			
$CF * (1 - NEG)$	**0.16**	**-0.23**	**-0.30**	**-0.30**
	(12.0)	(-4.50)	(-12.3)	(-12.5)
$CF * NEG$	**0.29**	**0.41**	**0.43**	**0.43**
	(24.5)	(21.5)	(30.2)	(30.2)
q	0.02	0.11	0.13	0.13
	(21.6)	(9.91)	(33.3)	(34.1)
$Size$	0.01	0.02	0.02	0.02
	(4.39)	(7.45)	(14.7)	(14.7)
$L.\Delta Cash$	-0.16	-0.18	-0.18	-0.18
	(-21.0)	(-20.7)	(-21.2)	(-21.2)
$L.Cash$	-0.28	-0.31	-0.32	-0.32
	(-32.7)	(-30.1)	(-30.4)	(-30.5)
Obs.	67,776	67,776	67,776	67,776
Rho	23.5%	30.5%	32.3%	32.3%
Tau	-	0.31	0.29	0.29

Table VIII. The corporate propensity to dissave: the size of negative cash flow shock.

Description: The baseline saving model in Eq.(2) is modified and estimated using OLS and the third- through fifth-order cumulant estimators. Panel A and Panel B report the results obtained using data in the level form and the within-transformation form, respectively. $\Delta Cash$ is the change in cash holdings scaled by assets. CF is cash flow scaled by assets. $Size$ is the natural log of book assets. Tobin's q is the market value of assets divided by the book value of assets. $Shock$ is equal to unity (zero) if the negative cash flow is classified as a large (small) cash flow loss. The negative cash flow in year t is classified as a large (small) cash flow loss if it exceeds (falls below) the size of cash assets and tangible assets in years $t-1$ and t. The sample is restricted to firms with large and small losses only. Table I describes the regression variables. The OLS t-statistics and the cumulant z-statistics are reported in parentheses. Rho is an estimate of the R^2 of the regression. $Tau \in (0,1)$ is an index of measurement quality for the q proxy.

Interpretation: The firms' propensity to dissave is robust but sensitive to the size of negative cash flow. First, firms with large negative cash flow dissave less because they are likely to abandon or scale down some of their unproductive assets (the option to wait is "out-of-the-money"). Second, firms with small negative cash flow dissave more because they are likely to continue to hold their unproductive assets (the option to wait is "in-the-money").

Panel A	OLS	Third	Fourth	Fifth
		Level		
$CF * Shock$	**0.18**	**0.40**	**0.39**	**0.39**
	(16.7)	(12.9)	(20.8)	(21.7)
$CF * (1 - Shock)$	**0.64**	**1.08**	**1.07**	**1.05**
	(12.4)	(12.2)	(14.5)	(14.7)
q	0.02	0.10	0.10	0.10
	(14.4)	(9.69)	(18.2)	(20.5)
$Size$	0.01	0.01	0.01	0.01
	(3.92)	(6.73)	(7.90)	(7.98)
Obs.	8,018	8,018	8,018	8,018
Rho	9.0%	25.0%	24.8%	24.2%
Tau	-	0.38	0.38	0.38

Panel B	OLS	Third	Fourth	Fifth
		Within-transformation		
$CF * Shock$	**0.24**	**0.42**	**0.39**	**0.39**
	(8.44)	(11.8)	(19.5)	(20.4)
$CF * (1 - Shock)$	**0.60**	**1.12**	**1.07**	**1.05**
	(5.22)	(11.4)	(14.0)	(14.2)
q	0.02	0.11	0.10	0.10
	(5.14)	(8.92)	(16.6)	(18.6)
$Size$	0.02	0.02	0.01	0.01
	(2.85)	(6.98)	(8.76)	(8.95)
Obs.	8,018	8,018	8,018	8,018
Rho	9.5%	27.0%	25.3%	24.9%
Tau	-	0.38	0.39	0.40

Table IX. The corporate propensity to dissave: financial constraints.

Description: The baseline saving model in Eq.(2) is estimated using OLS and the high-order cumulant estimators. Panel A and Panel B report the results obtained using data in the level form and the within-transformation form, respectively. $\Delta Cash$ is the change in cash holdings scaled by assets. CF is cash flow scaled by assets. NEG is equal to unity if the firm has a negative cash flow in year t, and zero otherwise. $Size$ is the natural log of book assets. Tobin's q is the market value of assets divided by the book value of assets. Firms with an asset size above the 67^{th} percentile of the size distribution in year t ($Large$) are treated unconstrained, while those below the 33^{rd} percentile ($Small$) – constrained. Dividend-paying or stock-repurchasing firms in year t (Pay) are treated as unconstrained, while non-dividend-paying and non-stock-repurchasing firms ($NoPay$) – as constrained. Table I describes the regression variables. The OLS t-statistics and the cumulant z-statistics are reported in parentheses. Rho is an estimate of the R^2 of the regression. $Tau \in (0,1)$ is an index of measurement quality for the q proxy.

Interpretation: The firms' propensity to dissave is robust but sensitive to the degree of external finance constraints. First, unconstrained firms are likely to dissave in response to negative cash flow because they find it easier to obtain external finance. Second, constrained firms are likely to preserve liquidity and thus dissave less.

Panel A	OLS		Cumulants		OLS		Cumulants	
	Large	Small	Large	Small	Pay	NoPay	Pay	NoPay
	Level				**Level**			
$CF * (1 - NEG)$	**0.01**	**0.19**	**-0.49**	**-0.10**	**0.04**	**0.14**	**-0.53**	**-0.26**
	(0.18)	(15.5)	(-13.3)	(-3.63)	(3.92)	(13.7)	(-17.4)	(-11.7)
$CF * NEG$	**0.17**	**0.22**	**0.50**	**0.54**	**0.28**	**0.23**	**0.66**	**0.56**
	(4.83)	(27.6)	(11.2)	(30.2)	(16.0)	(30.1)	(26.0)	(38.4)
q	0.01	0.02	0.08	0.11	0.02	0.02	0.11	0.11
	(15.4)	(22.4)	(19.8)	(27.0)	(19.2)	(29.1)	(32.7)	(39.3)
$Size$	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.01
	(-7.00)	(5.36)	(-5.51)	(9.53)	(-7.68)	(5.01)	(-4.13)	(8.49)
Obs.	28,124	28,119	28,124	28,119	41,478	43,738	41,478	43,738
Rho	3.5%	10.6%	17.4%	25.4%	7.5%	10.0%	22.7%	26.7%
Tau	-	-	0.32	0.28	-	-	0.31	0.29

Panel B	OLS		Cumulants		OLS		Cumulants	
	Large	Small	Large	Small	Pay	NoPay	Pay	NoPay
	Within-transformation				**Within-transformation**			
$CF * (1 - NEG)$	**0.06**	**0.24**	**-0.49**	**-0.09**	**0.12**	**0.20**	**-0.48**	**-0.21**
	(3.22)	(12.6)	(-8.09)	(-2.97)	(6.90)	(11.9)	(-12.7)	(-8.95)
$CF * NEG$	**0.23**	**0.27**	**0.38**	**0.38**	**0.34**	**0.29**	**0.54**	**0.40**
	(4.98)	(21.1)	(7.67)	(23.0)	(10.9)	(23.2)	(14.1)	(27.8)
q	0.01	0.02	0.11	0.13	0.02	0.02	0.13	0.13
	(8.20)	(13.8)	(11.5)	(20.8)	(10.1)	(16.0)	(24.7)	(48.4)
$Size$	0.00	0.02	0.01	0.06	0.00	0.01	0.01	0.04
	(0.84)	(6.65)	(5.25)	(13.7)	(1.04)	(6.42)	(6.00)	(19.0)
Obs.	28,124	28,119	28,124	28,119	41,478	43,738	41,478	43,738
Rho	7.6%	13.6%	11.8%	21.0%	22.4%	10.7%	16.2%	20.5%
Tau	-	-	0.26	0.24	-	-	0.28	0.25

Table X. The corporate propensity to dissave: cash flow uncertainty.

Description: The baseline saving model in Eq.(2) is estimated using OLS and the high-order cumulant estimators. Panel A and Panel B report the results obtained using data in the level form and the within-transformation form, respectively. $\Delta Cash$ is the change in cash holdings scaled by assets. CF is cash flow scaled by assets. NEG is equal to unity if the firm has a negative cash flow in year t, and zero otherwise. $Size$ is the natural log of book assets. Tobin's q is the market value of assets divided by the book value of assets. The standard deviation of the residuals from a first-order AR(1) autoregression of cash flow is estimated by firm. Firms with the standard deviation in the top (bottom) third of the distribution are considered as having high (low) cash flow uncertainty. Table I describes the regression variables. The OLS t-statistics and the cumulant z-statistics are reported in parentheses. Rho is an estimate of the R^2 of the regression. $Tau \in (0, 1)$ is an index of measurement quality for the q proxy.

Interpretation: The firms' propensity to dissave is robust but sensitive to the degree of cash flow uncertainty. First, firms that do not face a great deal of uncertainty dissave more in response to negative cash flow. Second, firms facing a great deal of uncertainty cannot make large changes in savings in response to negative cash flow.

Panel A	OLS		Cumulants	
	Low σ	High σ	Low σ	High σ
		Level		
$CF * (1 - NEG)$	**-0.01**	**0.14**	**-0.81**	**-0.18**
	(-0.56)	(11.3)	(-14.4)	(-6.60)
$CF * NEG$	**0.26**	**0.25**	**0.84**	**0.52**
	(5.30)	(28.3)	(11.8)	(31.1)
q	0.01	0.02	0.11	0.11
	(14.4)	(24.4)	(21.8)	(28.2)
$Size$	0.00	0.00	0.00	0.01
	(-8.77)	(4.13)	(-4.93)	(5.86)
Obs.	26,167	26,156	26,167	26,156
Rho	4.4%	11.4%	23.3%	26.8%
Tau	-	-	0.32	0.28

Panel B	OLS		Cumulants	
	Low σ	High σ	Low σ	High σ
		Within-transformation		
$CF * (1 - NEG)$	**0.01**	**0.19**	**-1.13**	**-0.17**
	(0.54)	(11.3)	(-11.7)	(-5.59)
$CF * NEG$	**0.39**	**0.29**	**0.82**	**0.40**
	(4.73)	(25.2)	(6.07)	(26.2)
q	0.02	0.02	0.18	0.13
	(10.0)	(17.0)	(15.3)	(19.8)
$Size$	0.00	0.01	0.01	0.04
	(-2.77)	(5.95)	(4.67)	(12.9)
Obs.	26,167	26,156	26,167	26,156
Rho	5.4%	9.9%	19.4%	23.0%
Tau	-	-	0.27	0.28

Table XI. The corporate propensity to dissave: cash reserves.

Description: The baseline saving model in Eq.(2) is estimated using OLS and the high-order cumulant estimators. Panel A and Panel B report the results obtained using data in the level form and the within-transformation form, respectively. $\Delta Cash$ is the change in cash holdings scaled by assets. CF is cash flow scaled by assets. NEG is equal to unity if the firm has a negative cash flow in year t, and zero otherwise. $Size$ is the natural log of book assets. Tobin's q is the market value of assets divided by the book value of assets. Sample firms are sorted by the ratio of cash holdings to assets. Firms in the top (bottom) third of the distribution in year t are defined as cash-rich (cash-poor). Table I describes the regression variables. The OLS t-statistics and the cumulant z-statistics are reported in parentheses. Rho is an estimate of the R^2 of the regression. $Tau \in (0,1)$ is an index of measurement quality for the q proxy.

Interpretation: The firms' propensity to dissave depends on the availability of cash. First, cash-poor firms do not dissave or dissave significantly less in response to negative cash flow because they are liquidity constrained. Second, cash-rich firms demonstrate a greater propensity to dissave.

Panel A	OLS		Cumulants	
	Cash-rich	Cash-poor	Cash-rich	Cash-poor
		Level		
$CF * (1 - NEG)$	**0.17**	**0.01**	**-0.36**	**-0.35**
	(10.6)	(0.76)	(-8.90)	(-11.2)
$CF * NEG$	**0.31**	**0.05**	**0.63**	**0.37**
	(26.2)	(5.70)	(28.8)	(13.3)
q	0.02	0.02	0.11	0.09
	(23.8)	(10.3)	(25.7)	(17.4)
$Size$	0.00	0.00	0.00	0.00
	(7.85)	(-15.7)	(0.80)	(-3.23)
Obs.	22,507	22,502	22,507	22,502
Rho	14.3%	7.5%	29.6%	31.9%
Tau	-	-	0.27	0.33

Panel B	OLS		Cumulants	
	Cash-rich	Cash-poor	Cash-rich	Cash-poor
		Within-transformation		
$CF * (1 - NEG)$	**0.30**	**0.04**	**-0.34**	**-0.27**
	(10.0)	(3.24)	(-7.59)	(-7.35)
$CF * NEG$	**0.39**	**0.04**	**0.49**	**0.22**
	(18.9)	(3.01)	(20.0)	(7.79)
q	0.02	0.01	0.14	0.10
	(10.9)	(7.39)	(40.9)	(12.5)
$Size$	0.01	0.00	0.04	0.01
	(4.03)	(-1.24)	(10.7)	(5.34)
Obs.	22,507	22,502	22,507	22,502
Rho	17.1%	48.1%	22.5%	20.2%
Tau	-	-	0.28	0.25

Table XII. The corporate propensity to dissave: the irreversibility of disinvestment.

Description: The baseline saving model in Eq.(2) is estimated using OLS and the high-order cumulant estimators. Panel A and Panel B report the results obtained using data in the level form and the within-transformation form, respectively. $\Delta Cash$ is the change in cash holdings scaled by assets. CF is cash flow scaled by assets. NEG is equal to unity if the firm has a negative cash flow in year t, and zero otherwise. $Size$ is the natural log of book assets. Tobin's q is the market value of assets divided by the book value of assets. Sample firms are sorted by the ratio of net PPE plus intangibles to total assets. Firms in the top (bottom) third of the distribution in year t are defined as high capital-intensive (low capital-intensive). Table I describes the regression variables. The OLS t-statistics and the cumulant z-statistics are reported in parentheses. Rho is an estimate of the R^2 of the regression. $Tau \in (0, 1)$ is an index of measurement quality for the q proxy.

Interpretation: The firms' propensity to dissave depends on the size of adjustment disinvestment costs (proxied by the intensity of non-cash productive capital). High capital-intensive firms dissave more in response to negative cash flow because their adjustment costs are often too high to reverse promptly and profitably.

Panel A	OLS		Cumulants	
	High-cap	Low-cap	High-cap	Low-cap
		Level		
$CF * (1 - NEG)$	**0.05**	**0.09**	**-0.17**	**-0.08**
	(5.53)	(6.10)	(-8.67)	(-1.63)
$CF * NEG$	**0.21**	**0.15**	**0.45**	**0.27**
	(15.6)	(9.48)	(21.4)	(6.85)
q	0.01	-0.01	0.07	0.04
	(7.25)	(-0.71)	(16.8)	(3.45)
$Size$	0.00	0.00	0.00	0.00
	(5.41)	(6.84)	(6.45)	(5.79)
Obs.	25,435	8,238	25,435	8,238
Rho	8.8%	11.8%	13.7%	11.3%
Tau	-	-	0.25	0.19

Panel B	OLS		Cumulants	
	High-cap	Low-cap	High-cap	Low-cap
		Within-transformation		
$CF * (1 - NEG)$	**0.10**	**0.11**	**-0.14**	**-0.03**
	(5.94)	(4.26)	(-5.29)	(-0.74)
$CF * NEG$	**0.25**	**0.10**	**0.38**	**0.16**
	(10.8)	(3.34)	(14.2)	(5.28)
q	0.01	-0.01	0.08	0.04
	(3.46)	(-0.33)	(14.4)	(5.44)
$Size$	0.00	0.00	0.01	0.01
	(2.53)	(1.28)	(9.27)	(4.64)
Obs.	25,435	8,238	25,435	8,238
Rho	19.9%	39.2%	8.9%	4.3%
Tau	-	-	0.19	0.10

Table XIII. Saving and negative cash flow.

Description: The baseline saving model in Eq.(2) is modified and estimated using OLS estimator. Columns (1) and (2) report the results obtained using data in the level form and the within-transformation form, respectively. $\Delta Cash$ is the change in cash holdings scaled by assets. CF is cash flow scaled by assets. $Size$ is the natural log of book assets. Tobin's q is the market value of assets divided by the book value of assets. The following restrictions are imposed to the sample firms in year t: (i) negative cash flow ($CF < 0$), (ii) negative investment (disinvestment) ($Inv < 0$), and (iii) the absolute value of disinvestment must exceed that of negative cash flow ($|Inv| > |CF|$). Table I describes the regression variables. The OLS t-statistics are reported in parentheses. *Rho* is an estimate of the R^2 of the regression.

Interpretation: Only a small group of negative cash flow firms (10% of the total number of observations) save in response to negative cash flow. This saving behavior holds under the specific condition: the size of a firm's negative cash flow *must* be smaller than the size of its disinvestment. However, when no disinvestment occurs or when the size of disinvestment falls below the size of negative cash flow, which are by far the most common scenarios (90% of the total number of observations), the propensity to dissave restores.

	(1)	(2)
$CF < 0$	**-0.10**	**-0.08**
	(-3.49)	(-2.83)
q	0.01	0.01
	(3.68)	(3.79)
$Size$	0.01	0.01
	(2.06)	(1.00)
Obs.	1,870	1,870
Rho	2.2%	3.5%

Table XIV. The corporate propensity to dissave: managerial agency costs.

Description: The baseline saving model in Eq.(2) is modified and estimated using OLS and the high-order cumulant estimators. Panel A and Panel B report the results obtained using data in the level form and the within-transformation form, respectively. $\Delta Cash$ is the change in cash holdings scaled by assets. CF is cash flow scaled by assets. $Size$ is the natural log of book assets. Tobin's q is the market value of assets divided by the book value of assets. $Inst$ is equal to unity if the percentage of institutional ownership ranks in the top decile in year t, and zero otherwise. The sample firms are split into those with positive ($CF > 0$) and negative ($CF < 0$) cash flows. Table I describes the regression variables. The OLS t-statistics and the cumulant z-statistics are reported in parentheses. Rho is an estimate of the R^2 of the regression. $Tau \in (0, 1)$ is an index of measurement quality for the q proxy.

Interpretation: The alternative explanation for the firms' propensity to dissave based on the agency problem argument is not sufficient. Firms dissave in response to negative cash flow irrespective of the size of the institutional ownership stake held in the firm.

Panel A	OLS		Cumulants	
	$CF > 0$	$CF < 0$	$CF > 0$	$CF < 0$
	Level			
CF	**0.09**	**0.25**	**-0.49**	**0.53**
	(9.22)	(19.7)	(-16.1)	(22.4)
$CF * Inst$	**-0.10**	**0.06**	**-0.31**	**0.25**
	(-4.61)	(0.78)	(-5.48)	(2.09)
q	0.02	0.02	0.10	0.11
	(22.3)	(15.7)	(34.1)	(19.9)
$Size$	-0.01	0.01	-0.01	0.01
	(-9.97)	(8.33)	(-3.37)	(5.98)
Obs.	46,004	9,931	46,004	9,931
Rho	5.1%	8.6%	22.4%	23.0%
Tau	-	-	0.30	0.32

Panel B	OLS		Cumulants	
	$CF > 0$	$CF < 0$	$CF > 0$	$CF < 0$
	Within-transformation			
CF	**0.18**	**0.33**	**-0.17**	**0.29**
	(10.7)	(11.4)	(-5.65)	(14.1)
$CF * Inst$	**-0.11**	**-0.04**	**-0.29**	**-0.04**
	(-3.70)	(-0.24)	(-4.41)	(-0.36)
q	0.01	0.02	0.14	0.15
	(12.6)	(6.20)	(19.6)	(37.3)
$Size$	-0.01	0.03	0.02	0.06
	(-1.68)	(4.02)	(9.03)	(10.8)
Obs.	46,004	9,931	46,004	9,931
Rho	9.9%	15.0%	16.5%	21.0%
Tau	-	-	0.24	0.22

Appendix A. The allocation of cash flow across various uses. The system of regression equations that provides a complete view of cash flow allocations is as follows:

$$\Delta Cash_{it} = \alpha^{\Delta Cash}(CF_{it} * NEG_{it}) + \beta^{\Delta Cash} CF_{it} * (1 - NEG_{it}) \\ + \gamma^{\Delta Cash} q_{it} + \delta^{\Delta Cash} Size_{it} + f_i + f_t + \epsilon_{it}^{\Delta Cash} \quad (9)$$

$$Inv_{it} = \alpha^{Inv}(CF_{it} * NEG_{it}) + \beta^{Inv} CF_{it} * (1 - NEG_{it}) \\ + \gamma^{Inv} q_{it} + \delta^{Inv} Size_{it} + f_i + f_t + \epsilon_{it}^{Inv} \quad (10)$$

$$\Delta WC_{it} = \alpha^{\Delta WC}(CF_{it} * NEG_{it}) + \beta^{\Delta WC} CF_{it} * (1 - NEG_{it}) \\ + \gamma^{\Delta WC} q_{it} + \delta^{\Delta WC} Size_{it} + f_i + f_t + \epsilon_{it}^{\Delta WC} \quad (11)$$

$$Div_{it} = \alpha^{Div}(CF_{it} * NEG_{it}) + \beta^{Div} CF_{it} * (1 - NEG_{it}) \\ + \gamma^{Div} q_{it} + \delta^{Div} Size_{it} + f_i + f_t + \epsilon_{it}^{Div} \quad (12)$$

$$\Delta D_{it} = \alpha^{\Delta D}(CF_{it} * NEG_{it}) + \beta^{\Delta D} CF_{it} * (1 - NEG_{it}) \\ + \gamma^{\Delta D} q_{it} + \delta^{\Delta D} Size_{it} + f_i + f_t + \epsilon_{it}^{\Delta D} \quad (13)$$

$$\Delta E_{it} = \alpha^{\Delta E}(CF_{it} * NEG_{it}) + \beta^{\Delta E} CF_{it} * (1 - NEG_{it}) \\ + \gamma^{\Delta E} q_{it} + \delta^{\Delta E} Size_{it} + f_i + f_t + \epsilon_{it}^{\Delta E} \quad (14)$$

The cash flow (accounting) identity in Eq.(1) implies that (i) sources of cash funds must equal uses of cash funds, and (ii) cash flow must equal uses of cash flow. Because all cash flow uses must absorb a cash flow shock completely, if cash flow increases by one dollar, the incremental allocations to all (six) cash flow uses must sum to one dollar. It means that a one-dollar increase in cash flow needs to be used to increase cash holdings, investment or working capital, pay dividends, reduce debt, or buy back shares. This integrated regression framework accounts for the interdependence among cash flow allocations and thus produces consistent CF coefficient estimates.

The coefficient estimates in Eq.(9) to (14) must satisfy the following conditions:

$$\alpha^{\Delta Cash} + \alpha^{Inv} + \alpha^{\Delta WC} + \alpha^{Div} - \alpha^{\Delta D} - \alpha^{\Delta E} = 1 \quad (15)$$

$$\beta^{\Delta Cash} + \beta^{Inv} + \beta^{\Delta WC} + \beta^{Div} - \beta^{\Delta D} - \beta^{\Delta E} = 1 \quad (16)$$

$$\gamma^{\Delta Cash} + \gamma^{Inv} + \gamma^{\Delta WC} + \gamma^{Div} - \gamma^{\Delta D} - \gamma^{\Delta E} = 0 \quad (17)$$

$$\delta^{\Delta Cash} + \delta^{Inv} + \delta^{\Delta WC} + \delta^{Div} - \delta^{\Delta D} - \delta^{\Delta E} = 0 \quad (18)$$

Constraints in Eq.(15) and (16) are consistent with the cash flow identity. Constraints in Eq.(17) and (18) stipulate that the total response across different sources and uses of cash funds must sum to zero if the shock stems from an exogenous or predetermined variable that represents neither a source nor use of cash funds (q and $Size$). If the variables in Eq.(1) are consistently defined so that the cash flow identity holds in the data, the adding-up constraints should hold automatically.

Description: The table reports the OLS results obtained by estimating the system of regression equations. The dependent variables are linked through the cash flow identity. The same set of explanatory variables is used in each regression equation. The adding-up constraints are reported in the column *Sum*. Panel A and Panel B report the results obtained using data in the level form and the within-transformation form, respectively. The variables include the change in cash holdings ($\Delta Cash$), cash flow (CF), investment (Inv), the change in working capital (ΔWC), cash dividends (Div), net debt issued (ΔD), and net equity issued (ΔE). The variables are scaled by total assets. NEG is equal to unity if the firm has a negative cash flow in year t, and zero otherwise. $Size$ is the natural log of book assets. Tobin's q is the market value of assets divided by the book value of assets. Table I describes the regression variables. The OLS t-statistics are reported in parentheses. *Rho* is an estimate of the R^2 of the regression.

Interpretation: The cash flow identity in Eq.(1) and the adding-up constraints in Eq.(15) to (18) hold in the data.

Panel A	$\Delta Cash^{\dagger}$	Inv	ΔWC	Div	ΔD	ΔE	Sum
				Level			
$CF*(1-NEG)$	**0.08**	**0.21**	**0.17**	**0.07**	**-0.18**	**-0.30**	**1.00**
	(10.8)	(23.3)	(22.9)	(20.2)	(-27.9)	(-31.6)	
$CF*NEG$	**0.24**	**0.15**	**0.24**	**0.00**	**-0.11**	**-0.26**	**1.00**
	(35.4)	(21.6)	(33.5)	(-2.63)	(-16.7)	(-24.2)	
q	0.02	0.01	0.01	0.00	0.00	0.04	**0.00**
	(34.9)	(27.4)	(16.2)	(4.20)	(7.21)	(47.2)	
$Size$	0.00	0.00	0.00	0.00	0.00	-0.01	**0.00**
	(-7.23)	(4.32)	(-19.0)	(15.9)	(22.3)	(-22.6)	
Obs.	85,216	85,216	85,216	85,216	85,216	85,216	
Rho	8.9%	6.7%	12.8%	7.6%	4.3%	23.4%	

Panel B	$\Delta Cash^{\dagger}$	Inv	ΔWC	Div	ΔD	ΔE	Sum
				Within-transformation			
$CF*(1-NEG)$	**0.14**	**0.09**	**0.25**	**0.03**	**-0.24**	**-0.24**	**1.00**
	(12.8)	(8.90)	(26.9)	(12.1)	(-26.3)	(-20.0)	
$CF*NEG$	**0.30**	**0.15**	**0.32**	**0.00**	**-0.12**	**-0.11**	**1.00**
	(29.2)	(16.1)	(31.8)	(-1.80)	(-13.3)	(-7.57)	
q	0.02	0.02	0.01	0.00	0.00	0.04	**0.00**
	(22.9)	(21.9)	(9.31)	(8.03)	(6.83)	(34.1)	
$Size$	0.00	0.02	0.00	0.00	0.03	0.00	**0.00**
	(3.78)	(19.9)	(-1.54)	(0.88)	(26.0)	(-0.63)	
Obs.	85,216	85,216	85,216	85,216	85,216	85,216	
Rho	11.4%	23.3%	26.0%	45.5%	15.6%	39.7%	

† The coefficient estimates reported in column $\Delta Cash$ are identical to those reported in column OLS of Table III.

Appendix B. Fama-MacBeth OLS and GMM coefficients for dissaving propensities.
Description: First, we apply cumulant estimators in the panel data, while Riddick and Whited (2009) – moment estimators in the cross-sectional/pooled data. Although the two estimators are asymptotically equivalent and the cumulant estimators are an advance beyond the moment estimators, we aim to ensure that our statistical inferences are not affected by the selection of the estimation technique (cumulant vs. moment estimators) and the data form (panel vs. cross-sectional/pooled data).

Second, we define the cash flow variable using the cash flow statement, while Riddick and Whited – the income statement (*ib*, item 18 plus *dp*, item 14). We consider items that are associated with actual cash inflows and outflows, while Riddick and Whited – with income proxy. Although the two cash flow definitions are highly correlated ($\rho = 0.87$, $p < 0.001$), we aim to ensure that our statistical inferences are not affected by the selection of the cash flow items (flow-of-funds vs. income proxy).

Third, our sample starts at 1984, which is the year the Compustat files start to report flow-of-funds data extensively, while Riddick and Whited's sample – at 1972. Although the two sample periods overlap, we aim to ensure that our statistical inferences are not affected by the selection of the sample period (1984 to 2016 vs. 1972 to 2006).

The table reports (i) the estimates for each cross section of the panel and (ii) the pooled estimates via the procedure in Fama and MacBeth (1973). The yearly estimates are obtained using OLS and GMM high-order moment estimators. Panel A reports the estimates for our definition of cash flow and sample period. Panel B reports the estimates for Riddick and Whited's definition of cash flow and sample period. Following Riddick and Whited (2009), firm fixed effects are excluded from the saving model in Eq.(2). $\Delta Cash$ is the change in cash holdings scaled by assets. CF is cash flow scaled by assets. NEG is equal to unity if the firm has a negative cash flow in year t, and zero otherwise. $Size$ is the natural log of book assets. Tobin's q is the market value of assets divided by the book value of assets. Table I describes the regression variables. The OLS t-statistics and GMM z-statistics are reported in parentheses. Rho is an estimate of the R^2 of the regression. $Tau \in (0, 1)$ is an index of measurement quality for the q proxy. $Jstat$ refers to the Sargan-Hansen J-statistics for overidentifying restrictions. $Jval$ refers to the p-value for the Sargan-Hansen test. Fama-MacBeth (FMB) coefficients are reported at the bottom of the table.
Interpretation: The firms' propensity to dissave is robust to (i) the estimation method (cumulant vs. moment estimators), (ii) the data form (panel vs. cross-sectional/pooled data), (iii) the cash flow definition (actual cash flow vs. income proxy), and (iv) the sample period (1984 to 2016 vs. 1972 to 2006).

Panel A			**OLS**					**GMM moments**				
	Obs.	$CF*$ $(1-NEG)$	$CF*$ NEG	q	Rho	$CF*$ $(1-NEG)$	$CF*$ NEG	q	Rho	Tau	$Jstat$	$Jval$
1984	2,569	**0.24**	**0.30**	**0.01**	10.4%	**-0.06**	**0.58**	**0.11**	19.9%	0.28	13.6	0.00
		(5.88)	(6.28)	(1.77)		(-0.92)	(8.41)	(6.59)				
1985	2,354	**0.17**	**0.23**	**0.02**	8.1%	**-0.12**	**0.50**	**0.09**	26.8%	0.37	23.3	0.00
		(4.50)	(4.94)	(3.86)		(-2.07)	(7.30)	(10.4)				
1986	2,309	**0.08**	**0.36**	**0.02**	10.8%	**-0.75**	**0.98**	**0.19**	38.6%	0.29	1.54	0.46
		(1.92)	(7.31)	(6.68)		(-4.83)	(6.94)	(7.05)				
1987	2,308	**0.26**	**0.19**	**0.01**	7.1%	**-0.10**	**0.50**	**0.10**	13.6%	0.28	11.3	0.00
		(6.76)	(3.77)	(2.26)		(-1.33)	(6.17)	(6.56)				
1988	2,278	**0.13**	**0.28**	**0.00**	9.9%	**-0.28**	**0.68**	**0.10**	14.4%	0.31	6.99	0.03
		(3.18)	(5.77)	(1.20)		(-2.14)	(4.88)	(3.70)				
1989	2,208	**0.12**	**0.22**	**0.01**	8.4%	**-0.39**	**0.64**	**0.12**	19.2%	0.32	0.50	0.78
		(3.01)	(5.12)	(3.79)		(-4.29)	(7.73)	(7.69)				
1990	2,222	**0.13**	**0.20**	**0.00**	6.8%	**-0.52**	**0.66**	**0.13**	22.4%	0.30	9.78	0.08
		(2.97)	(4.76)	(1.06)		(-3.49)	(6.06)	(4.91)				
1991	2,334	**0.02**	**0.17**	**0.02**	7.4%	**-0.69**	**0.60**	**0.11**	32.0%	0.35	0.55	0.76
		(0.41)	(3.07)	(7.48)		(-6.28)	(7.72)	(8.98)				
1992	2,520	**0.08**	**0.21**	**0.02**	5.4%	**-0.66**	**0.90**	**0.13**	30.8%	0.36	7.48	0.19
		(1.78)	(4.17)	(4.94)		(-7.21)	(9.42)	(12.5)				
1993	2,802	**0.01**	**0.15**	**0.01**	3.8%	**-0.98**	**0.84**	**0.17**	36.4%	0.30	7.89	0.02
		(0.02)	(3.83)	(5.62)		(-4.93)	(5.75)	(5.87)				
1994	2,983	**0.05**	**0.22**	**0.01**	6.5%	**-0.66**	**0.60**	**0.13**	25.4%	0.29	5.38	0.07
		(1.14)	(5.77)	(4.85)		(-5.70)	(7.38)	(8.23)				
1995	3,160	**-0.05**	**0.23**	**0.03**	9.6%	**-0.51**	**0.59**	**0.10**	34.8%	0.40	3.42	0.18
		(-1.36)	(5.49)	(10.9)		(-7.56)	(9.45)	(12.6)				
1996	3,295	**-0.11**	**0.23**	**0.02**	7.9%	**-0.77**	**0.68**	**0.14**	37.7%	0.31	2.39	0.30
		(-2.92)	(7.28)	(9.78)		(-8.07)	(10.1)	(11.3)				
1997	3,309	**0.04**	**0.26**	**0.01**	8.5%	**-0.56**	**0.61**	**0.11**	24.4%	0.28	8.10	0.15
		(1.20)	(8.42)	(5.19)		(-6.60)	(11.1)	(9.56)				
1998	3,303	**0.12**	**0.22**	**0.01**	8.4%	**-0.41**	**0.54**	**0.10**	21.5%	0.25	3.10	0.21
		(3.54)	(6.84)	(4.45)		(-4.97)	(9.26)	(8.83)				
1999	3,244	**-0.04**	**0.23**	**0.03**	14.1%	**-0.36**	**0.59**	**0.09**	43.7%	0.34	28.4	0.00
		(-1.11)	(7.37)	(13.4)		(-6.12)	(12.1)	(14.6)				
2000	3,142	**-0.09**	**0.28**	**0.03**	12.5%	**-0.39**	**0.45**	**0.09**	27.1%	0.36	5.19	0.07
		(-2.68)	(8.38)	(11.1)		(-7.08)	(11.0)	(11.8)				
2001	2,929	**0.11**	**0.34**	**0.02**	18.2%	**-0.41**	**0.61**	**0.12**	35.2%	0.26	5.57	0.06
		(3.01)	(10.8)	(5.88)		(-5.14)	(12.6)	(10.0)				
2002	2,837	**0.22**	**0.31**	**0.02**	20.0%	**-0.21**	**0.53**	**0.11**	31.4%	0.32	14.6	0.00
		(5.98)	(8.85)	(4.93)		(-2.30)	(10.1)	(6.35)				
2003	2,698	**0.18**	**0.19**	**0.02**	11.5%	**-0.53**	**0.66**	**0.14**	43.2%	0.31	1.60	0.45
		(5.29)	(5.41)	(8.47)		(-4.85)	(8.19)	(8.74)				
2004	2,646	**0.07**	**0.25**	**0.02**	8.8%	**-0.57**	**0.68**	**0.12**	31.5%	0.34	5.81	0.06
		(2.07)	(5.92)	(6.39)		(-4.80)	(7.47)	(7.08)				
2005	2,663	**0.03**	**0.24**	**0.01**	8.1%	**-0.62**	**0.60**	**0.12**	28.7%	0.33	3.94	0.14
		(0.79)	(7.17)	(5.34)		(-5.93)	(9.66)	(8.35)				
2006	2,507	**0.12**	**0.19**	**0.02**	7.6%	**-0.52**	**0.65**	**0.13**	30.0%	0.36	5.15	0.08
		(2.84)	(4.18)	(5.71)		(-5.35)	(8.27)	(9.85)				
2007	2,497	**-0.03**	**0.32**	**0.02**	10.8%	**-0.65**	**0.69**	**0.13**	33.3%	0.37	3.90	0.14
		(-0.68)	(8.71)	(7.11)		(-6.60)	(10.5)	(9.65)				
2008	2,467	**0.24**	**0.23**	**0.01**	9.8%	**0.06**	**0.40**	**0.07**	14.2%	0.39	8.54	0.01
		(6.08)	(4.96)	(3.31)		(0.95)	(6.84)	(5.26)				
2009	2,388	**0.16**	**0.31**	**0.02**	12.3%	**-0.28**	**0.72**	**0.11**	24.8%	0.37	0.69	0.71
		(4.02)	(6.66)	(5.59)		(-3.60)	(9.71)	(8.71)				
2010	2,305	**0.16**	**0.21**	**0.02**	9.1%	**-0.31**	**0.62**	**0.12**	30.7%	0.34	7.55	0.18
		(3.73)	(4.02)	(5.76)		(-4.04)	(8.44)	(11.5)				
2011	2,264	**0.10**	**0.19**	**0.01**	5.5%	**-0.32**	**0.56**	**0.10**	21.6%	0.35	8.64	0.01
		(2.11)	(4.10)	(3.69)		(-3.97)	(7.54)	(8.13)				
2012	2,216	**0.10**	**0.28**	**0.02**	11.1%	**-0.32**	**0.69**	**0.12**	33.8%	0.35	8.88	0.01
		(2.46)	(6.17)	(4.70)		(-3.76)	(8.62)	(8.51)				
2013	2,228	**-0.01**	**0.18**	**0.03**	10.0%	**-0.38**	**0.48**	**0.10**	36.2%	0.41	9.33	0.10
		(-0.22)	(4.23)	(8.25)		(-5.15)	(8.89)	(14.1)				
2014	2,261	**0.06**	**0.25**	**0.01**	7.3%	**-0.61**	**0.78**	**0.15**	32.1%	0.30	9.93	0.01
		(1.29)	(5.65)	(4.14)		(-4.10)	(7.26)	(6.31)				
2015	2,163	**0.04**	**0.15**	**0.01**	3.6%	**-0.43**	**0.56**	**0.12**	24.4%	0.32	9.29	0.10
		(0.97)	(3.81)	(3.43)		(-4.30)	(6.99)	(7.02)				
2016	1,807	**0.17**	**0.19**	**0.01**	8.4%	**-0.62**	**0.59**	**0.12**	21.1%	0.28	5.74	0.06
		(3.11)	(5.12)	(1.55)		(-3.46)	(6.14)	(5.28)				
FMB	85,216	**0.09**	**0.24**	**0.02**	9.3%	**-0.45**	**0.63**	**0.12**	28.5%			
t-stat.		(5.31)	(25.2)	(14.9)		(11.6)	(29.6)	(28.8)				

The fraction of the yearly GMM estimates of the $CF*NEG$ coefficient that are significantly positive at the 5% level is 100%. The fraction of the yearly tests of overidentifying restrictions that produce acceptance at the 5% level is 68%.

Panel B		OLS				GMM moments						
	Obs.	$CF*$ $(1-NEG)$	$CF*$ NEG	q	Rho	$CF*$ $(1-NEG)$	$CF*$ NEG	q	Rho	Tau	$Jstat$	$Jval$
1972	2,871	**0.10**	**0.06**	**0.01**	4.5%	**-0.92**	**0.60**	**0.09**	25.0%	0.32	5.43	0.07
		(3.46)	(1.67)	(4.82)		(-4.03)	(3.49)	(5.08)				
1973	2,985	**0.07**	**-0.05**	**0.00**	0.9%	**-0.51**	**0.22**	**0.08**	4.8%	0.25	10.6	0.30
		(2.24)	(-0.54)	(0.92)		(-2.73)	(1.58)	(3.33)				
1974	2,990	**0.22**	**-0.08**	**-0.01**	4.2%	**0.27**	**-0.11**	**-0.03**	5.1%	0.47	7.93	0.02
		(6.86)	(-0.90)	(-4.93)		(6.39)	(-1.22)	(-3.18)				
1975	3,010	**0.19**	**0.11**	**0.01**	5.7%	**-0.33**	**0.48**	**0.13**	12.9%	0.29	6.75	0.24
		(6.14)	(3.65)	(2.63)		(-2.46)	(3.44)	(4.50)				
1976	2,976	**0.17**	**0.06**	**0.01**	4.7%	**-0.76**	**0.61**	**0.22**	15.9%	0.29	4.20	0.52
		(5.27)	(1.76)	(1.65)		(-1.74)	(2.04)	(2.26)				
1977	2,936	**0.06**	**0.19**	**0.01**	2.6%	**-0.66**	**0.70**	**0.18**	8.4%	0.29	6.80	0.24
		(1.91)	(3.66)	(1.87)		(-4.01)	(3.82)	(4.76)				
1978	3,036	**0.10**	**0.01**	**0.01**	2.5%	**-0.49**	**0.41**	**0.16**	9.6%	0.23	12.9	0.17
		(3.52)	(0.42)	(2.54)		(-3.36)	(3.01)	(4.62)				
1979	3,124	**0.04**	**0.13**	**0.01**	2.0%	**-0.21**	**0.27**	**0.06**	6.2%	0.25	0.48	0.79
		(1.37)	(1.54)	(2.32)		(-3.22)	(3.01)	(4.62)				
1980	3,172	**0.09**	**0.13**	**0.02**	6.3%	**-0.68**	**0.49**	**0.13**	23.3%	0.30	33.8	0.00
		(2.55)	(4.01)	(4.58)		(-4.91)	(5.13)	(7.09)				
1981	3,423	**0.18**	**0.10**	**0.02**	6.1%	**-0.62**	**0.58**	**0.18**	31.8%	0.30	34.0	0.00
		(5.45)	(2.14)	(4.85)		(-6.05)	(5.86)	(9.89)				
1982	3,407	**0.21**	**0.12**	**0.01**	6.5%	**-0.76**	**0.59**	**0.18**	24.3%	0.23	43.7	0.00
		(5.75)	(3.21)	(3.52)		(-4.66)	(6.17)	(7.34)				
1983	3,570	**0.05**	**0.21**	**0.03**	9.8%	**-1.17**	**0.91**	**0.25**	45.8%	0.26	45.2	0.00
		(1.22)	(5.86)	(9.58)		(-7.92)	(7.82)	(12.4)				
1984	3,627	**0.15**	**0.19**	**0.00**	4.9%	**-0.75**	**0.66**	**0.20**	15.8%	0.22	17.9	0.00
		(3.97)	(5.22)	(0.73)		(-3.97)	(5.21)	(5.23)				
1985	3,571	**0.19**	**0.12**	**0.01**	5.6%	**-0.80**	**0.47**	**0.20**	26.5%	0.25	52.3	0.00
		(4.67)	(4.55)	(3.12)		(-6.11)	(6.54)	(10.3)				
1986	3,671	**0.11**	**0.14**	**0.02**	6.9%	**-1.62**	**0.74**	**0.27**	37.0%	0.27	45.6	0.00
		(2.68)	(5.51)	(7.24)		(-6.81)	(7.55)	(8.91)				
1987	3,760	**0.27**	**0.11**	**0.01**	4.4%	**-1.30**	**0.78**	**0.29**	22.8%	0.21	29.9	0.00
		(6.35)	(2.58)	(2.77)		(-3.93)	(4.68)	(5.12)				
1988	3,621	**0.16**	**0.17**	**0.01**	6.9%	**-0.87**	**0.62**	**0.21**	19.7%	0.25	34.8	0.00
		(4.44)	(5.79)	(3.05)		(-4.23)	(5.66)	(5.73)				
1989	3,485	**0.15**	**0.15**	**0.01**	6.6%	**-0.88**	**0.59**	**0.19**	21.5%	0.25	20.7	0.01
		(3.99)	(5.06)	(3.79)		(-4.94)	(6.66)	(6.59)				
1990	3,498	**0.15**	**0.15**	**0.01**	6.1%	**-0.81**	**0.54**	**0.17**	22.8%	0.29	28.1	0.00
		(4.15)	(5.04)	(3.61)		(-6.21)	(7.76)	(8.92)				
1991	3,583	**0.09**	**0.12**	**0.02**	9.3%	**-1.41**	**0.76**	**0.20**	41.6%	0.30	60.3	0.00
		(2.12)	(3.87)	(8.62)		(-7.26)	(7.38)	(10.1)				
1992	3,787	**0.11**	**0.18**	**0.02**	9.0%	**-1.43**	**0.92**	**0.22**	39.1%	0.31	61.8	0.00
		(2.75)	(5.61)	(7.63)		(-7.42)	(7.97)	(10.4)				
1993	4,122	**0.02**	**0.22**	**0.02**	8.3%	**-1.98**	**1.13**	**0.28**	47.7%	0.29	58.8	0.00
		(0.55)	(6.41)	(9.17)		(-9.05)	(9.27)	(12.0)				
1994	4,362	**0.07**	**0.20**	**0.02**	8.1%	**-1.31**	**0.72**	**0.21**	33.7%	0.32	58.4	0.00
		(1.72)	(7.15)	(7.83)		(-9.56)	(10.6)	(13.5)				
1995	4,695	**0.01**	**0.19**	**0.03**	10.6%	**-1.36**	**0.80**	**0.23**	46.7%	0.25	89.5	0.00
		(0.40)	(6.95)	(12.1)		(-9.86)	(10.9)	(15.2)				
1996	5,085	**-0.08**	**0.19**	**0.03**	9.4%	**-1.63**	**0.85**	**0.27**	41.4%	0.22	118.8	0.00
		(-2.04)	(7.23)	(13.4)		(-10.6)	(10.6)	(14.4)				
1997	5,257	**0.05**	**0.20**	**0.02**	8.2%	**-1.57**	**0.79**	**0.25**	35.1%	0.20	92.1	0.00
		(1.44)	(8.53)	(9.47)		(-9.85)	(11.7)	(13.7)				
1998	5,111	**0.05**	**0.18**	**0.02**	8.4%	**-1.31**	**0.72**	**0.21**	28.0%	0.20	89.2	0.00
		(1.59)	(9.61)	(9.44)		(-7.73)	(9.82)	(9.81)				
1999	4,928	**-0.04**	**0.17**	**0.03**	14.4%	**-0.43**	**0.46**	**0.10**	47.5%	0.39	17.7	0.00
		(-1.00)	(6.37)	(17.6)		(-8.09)	(14.1)	(28.1)				
2000	4,793	**-0.08**	**0.11**	**0.02**	6.6%	**-0.42**	**0.23**	**0.09**	21.2%	0.34	4.70	0.10
		(-2.14)	(5.56)	(11.8)		(-7.90)	(9.33)	(14.5)				
2001	4,499	**0.21**	**0.24**	**0.02**	17.0%	**-0.41**	**0.41**	**0.12**	28.0%	0.18	80.2	0.00
		(6.16)	(13.3)	(7.42)		(-5.29)	(14.0)	(12.5)				
2002	4,317	**0.22**	**0.26**	**0.02**	20.4%	**-0.44**	**0.42**	**0.12**	29.9%	0.25	9.59	0.09
		(6.39)	(12.5)	(6.13)		(-3.58)	(10.9)	(6.85)				
2003	4,091	**0.20**	**0.16**	**0.02**	11.2%	**-0.91**	**0.58**	**0.19**	38.9%	0.24	78.0	0.00
		(5.39)	(6.10)	(10.3)		(-6.82)	(9.52)	(11.3)				
2004	4,060	**0.06**	**0.16**	**0.02**	7.4%	**-1.53**	**0.82**	**0.24**	36.8%	0.28	88.4	0.00
		(1.52)	(5.09)	(9.47)		(-7.24)	(7.90)	(9.70)				
2005	3,941	**0.07**	**0.18**	**0.02**	7.2%	**-1.52**	**0.72**	**0.23**	35.2%	0.27	44.5	0.00
		(1.66)	(5.79)	(7.73)		(-8.05)	(8.61)	(10.1)				
2006	3,846	**0.04**	**0.13**	**0.02**	5.4%	**-0.88**	**0.51**	**0.15**	30.0%	0.31	15.2	0.01
		(1.03)	(4.82)	(7.38)		(-8.37)	(8.60)	(12.0)				
2007	3,742	**-0.11**	**0.28**	**0.02**	9.1%	**-1.16**	**0.61**	**0.16**	28.4%	0.32	52.4	0.00
		(-2.60)	(10.1)	(7.72)		(-8.78)	(10.5)	(10.8)				
2008	3,567	**0.20**	**0.14**	**0.01**	10.0%	**-0.58**	**0.34**	**0.15**	13.7%	0.21	16.4	0.01
		(5.15)	(7.33)	(1.81)		(-3.55)	(7.15)	(5.51)				
2009	3,529	**0.17**	**0.20**	**0.02**	13.4%	**-0.54**	**0.46**	**0.13**	29.4%	0.35	8.86	0.12
		(4.41)	(7.48)	(7.03)		(-4.99)	(9.35)	(8.54)				
2010	3,419	**0.08**	**0.21**	**0.02**	8.5%	**-0.78**	**0.69**	**0.16**	30.8%	0.32	46.6	0.00
		(2.07)	(5.52)	(7.39)		(-7.34)	(8.97)	(13.0)				
2011	3,322	**0.08**	**0.17**	**0.02**	6.3%	**-0.48**	**0.43**	**0.11**	22.5%	0.34	10.5	0.06
		(1.94)	(4.49)	(5.40)		(-7.43)	(9.15)	(15.0)				
2012	3,267	**0.07**	**0.16**	**0.02**	6.8%	**-0.95**	**0.61**	**0.18**	28.0%	0.24	43.6	0.00
		(1.53)	(4.64)	(5.31)		(-5.99)	(7.27)	(8.05)				
2013	3,289	**-0.10**	**0.14**	**0.03**	11.6%	**-0.63**	**0.36**	**0.11**	23.7%	0.30	69.6	0.00
		(-2.52)	(4.57)	(11.1)		(-7.99)	(8.37)	(10.3)				
2014	3,356	**-0.08**	**0.12**	**0.02**	5.2%	**-0.80**	**0.43**	**0.12**	30.8%	0.32	5.52	0.06
		(-1.83)	(3.17)	(8.25)		(-8.20)	(8.10)	(11.4)				
2015	3,274	**-0.04**	**0.07**	**0.02**	2.9%	**-1.62**	**0.58**	**0.24**	33.4%	0.22	60.2	0.00
		(-0.99)	(2.59)	(5.84)		(-8.77)	(7.50)	(11.6)				
2016	2,734	**0.03**	**0.13**	**0.01**	4.3%	**-0.83**	**0.38**	**0.12**	23.2%	0.27	9.93	0.08
		(0.67)	(3.60)	(3.41)		(-5.99)	(7.02)	(7.73)				
FMB	166,709	**0.09**	**0.15**	**0.02**	7.5%	**-0.91**	**0.57**	**0.17**	27.2%			
t-stat.		(6.22)	(14.0)	(12.3)		(13.1)	(17.7)	(17.6)				

The fraction of the yearly GMM estimates of the $CF*NEG$ coefficient that are significantly positive at the 5% level is 98%. The fraction of the yearly tests of overidentifying restrictions that produce acceptance at the 5% level is 26%.

Appendix C. Subsamples of positive and negative cash flows.

Description: The table reports the results obtained by estimating the baseline saving model in Eq.(2) using OLS and the high-order cumulant estimators in the subsamples of positive ($CF > 0$) and negative ($CF < 0$) cash flows. Panel A and Panel B report the results obtained using data in the level form and the within-transformation form, respectively. $\Delta Cash$ is the change in cash holdings scaled by assets. CF is cash flow scaled by assets. $Size$ is the natural log of book assets. Tobin's q is the market value of assets divided by the book value of assets. Table I describes the regression variables. The OLS t-statistics and the cumulant z-statistics are reported in parentheses. Rho is an estimate of the R^2 of the regression. $Tau \in (0, 1)$ is an index of measurement quality for the q proxy.

Interpretation: The firms' propensity to dissave is robust to the sample split into positive and negative cash flows. The correlations between cash flow (CF) and controls (q and $Size$) do not affect the statistical inferences drawn in the baseline tests.

Panel A	OLS		Cumulants	
	(1)	(2)	(3)	(4)
	$CF > 0$	$CF < 0$	$CF > 0$	$CF < 0$
	Level			
CF	**0.10**	**0.24**	**-0.48**	**0.49**
	(12.0)	(28.9)	(-19.4)	(31.0)
q	0.02	0.02	0.10	0.11
	(27.5)	(22.9)	(39.8)	(26.4)
$Size$	0.00	0.01	0.00	0.01
	(-14.2)	(8.12)	(-3.31)	(11.2)
Obs.	65,853	19,363	65,853	19,363
Rho	5.4%	8.5%	23.3%	22.9%
Tau	-	-	0.27	0.34

Panel B	OLS		Cumulants	
	(1)	(2)	(3)	(4)
	$CF > 0$	$CF < 0$	$CF > 0$	$CF < 0$
	Within-transformation			
CF	**0.16**	**0.30**	**-0.04**	**0.33**
	(13.4)	(19.3)	(-2.32)	(26.3)
q	0.01	0.02	0.13	0.13
	(16.4)	(12.0)	(25.8)	(53.6)
$Size$	0.00	0.02	0.02	0.06
	(-1.63)	(6.47)	(13.0)	(17.1)
Obs.	65,853	19,363	65,853	19,363
Rho	10.2%	37.7%	17.2%	21.5%
Tau	-	-	0.22	0.27