Transient institutional ownership, costly external finance, and corporate cash holdings

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Abstract

We investigate and robustly show that transient institutional ownership has a positive effect on the level and value of corporate cash holdings. Further, using a regression discontinuity design exploiting the Russell 1000/2000 index reconstitution as an exogenous shock to transient institutional ownership, we show that the effects of transient institutional ownership on cash holdings are causal. Additionally, our analysis shows that transient institutions exacerbate debtholder–shareholder conflicts, thereby increasing the cost of debt. Overall, our results suggest that transient institutions make cash holdings more valuable because financing by debt becomes more costly.

JEL classification: G23, G31, G32, G34

Keywords: transient institutional ownership, cash holdings, costly external finance, debtholder–shareholder conflicts, stock price crash risk

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1 INTRODUCTION

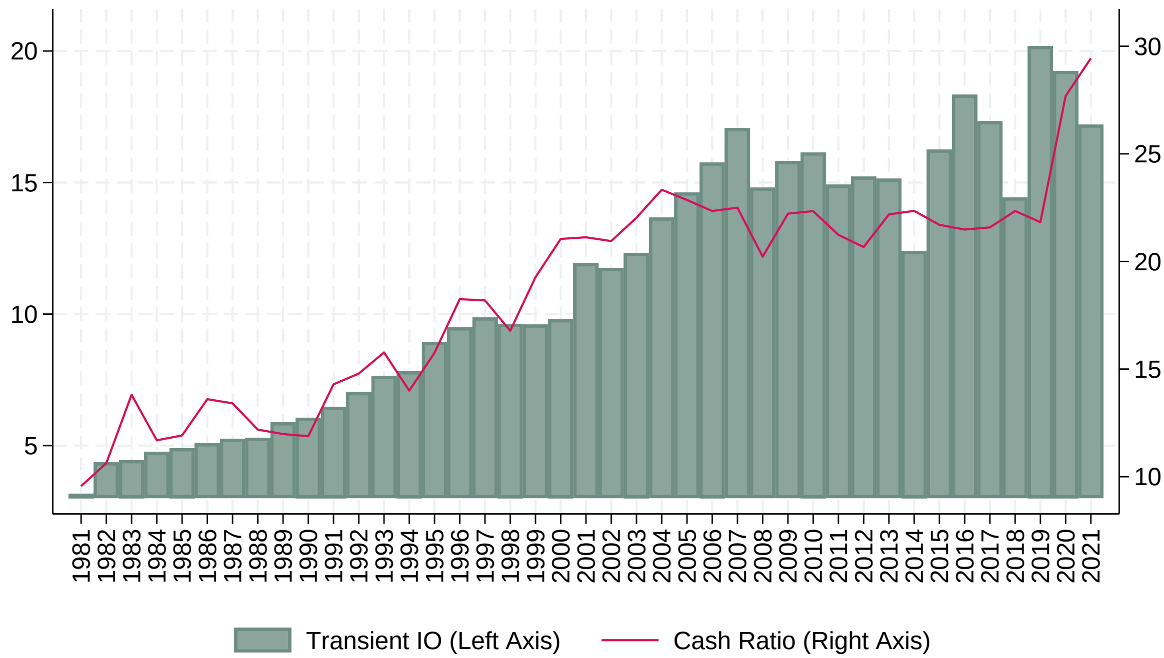
Our study examines how transient institutional ownership affects corporate financial policy—specifically, focusing on corporate cash holdings. Further, we explore the implications of this relationship for the value of cash to shareholders. These questions are important because there remains much confusion and mixed views about whether firms holding cash is desirable. It seems that in some circumstances holding more cash is a good thing, while in other contexts it is not. We conjecture that ownership structure is a largely under-exploited dimension that sheds meaningful light on this empirical puzzle.

In an influential study, Bates et al. (2009) document that corporate cash balances (relative to total assets) in the U.S. more than doubled from 10.5% in the 1980s to over 23% in 2006.[1] Much of the popular business press, along with many academic studies (e.g., Jensen, 1986; Harford, 1999; Dittmar and Mahrt-Smith, 2007; Harford et al., 2008), have argued that large cash balances can be a symptom of heightened agency conflicts. However, Bates et al. (2018) report that the value of (a dollar of) cash holdings has increased substantially in recent decades, i.e., from \$0.61 in the 1980s, to \$1.04 in the 1990s, and to \$1.12 in the 2000s, suggesting that investors actually have a very favourable view about the rising trend in cash holdings. They also show that this value increase is mainly driven by the investment opportunity set, cash flow volatility, and credit market risk, consistent with the precautionary motive for holding cash. Opler et al. (1999) and Bates et al. (2009) also find that increases in cash balances are related to changes in firm characteristics associated with the precautionary motive for cash holdings (i.e., cash flow volatility and R&D spending). However, little is known about the effect that ownership has in this setting. Does institutional ownership matter? If it does matter, in what ways? Moreover, absent in the literature is a comprehensive analysis of the role of transient institutional ownership (IO) on corporate cash holdings.

For reasons expounded below, we argue that transient IO is a key piece in the puzzle. Tran-

[1] In line with this study, Fig. 1 shows that the mean level of cash in U.S. companies as a percentage of their total assets has more than tripled from 9.56% in 1981 to 29.44% in 2021.

FIGURE 1 Transient institutional ownership and cash holdings



This figure shows the cross-sectional means of transient institutional ownership percentages and cash-to-total assets ratios. Transient institutional ownership is defined as institutional ownership with high portfolio turnover and diversified portfolios by Bushee (1998) and Bushee (2001). The bar presents the average percentages of transient institutional ownership and the solid line the average values of cash ratios. The sample period is 1981 to 2021.

sient IO is widely viewed as the embodiment of short-term investors. This type of ownership has soared from 3.2% in 1981 to 20.2% in 2019 for U.S. companies (see Fig. 1). This sharp increase in transient IO has attracted considerable media, professional and academic attention. Transient institutional owners are generally perceived as less-motivated monitors because they typically engage in short-term ownership strategies aiming to generate immediate returns (e.g., Maug, 1998; Kahn and Winton, 1998). As such, their existence can encourage managerial myopia (Bolton et al., 2006; Bushee, 1998; Stein, 1989). The literature, however, offers mixed evidence on their effect on corporate policies. For example, transient shareholdings are associated with lower R&D expenditures, more leverage, and higher payouts (Cremers et al., 2020) but greater innovation efficiency (Brav et al., 2018) and better performance in turbulent economic times (Giannetti and Yu, 2021).

Using both "exit" and "voice" approaches, transient institutional owners can force managers to behave in their interests, driven by short-termism-oriented motives (Graham et al., 2005). Such managerial myopia increases cash flow uncertainty, which exposes these firms to higher liquidity risk, particularly in economic downturns, and possible underinvestment (Bushee and Noe, 2000). This problem is especially prevalent in financially constrained firms or firms whose investment opportunities and cash flows are weakly connected. Shareholders of these firms are concerned about the reduction in the firms' profitability driven by foregoing worthwhile investment opportunities due to firms' costly external finance. Thus, they assign a relatively high value to each dollar of cash holdings (Faulkender and Wang, 2006; Denis and Sibilkov, 2009) and, therefore, countenance managers holding relatively large cash reserves for the precautionary motive (Opler et al., 1999; Almeida et al., 2004; Han and Qiu, 2007). Moreover, according to Campello et al. (2011), more than half of surveyed CEOs indicate that they rely on internal cash flows for investment when debt financing is not available. In sum, to the extent that greater transient IO leads to more costly external finance, other things being equal, firms could benefit from holding larger cash reserves to avoid underinvestment and to enhance financial flexibility. In addition, by holding more cash to mitigate potential liquidity risk and to avoid underinvestment, firms can dampen the adverse effect from costly external finance, driving a positive association between transient IO and the marginal value of cash holdings to shareholders.

Based on a panel of 148,508 firm-year observations encompassing 16,215 firms over the period 1981–2021, we find a strong positive association between transient IO and corporate cash holdings. However, there is a potential endogeneity problem that might undermine legitimate causal inferences. First, transient institutional owners might prefer firms with high levels of cash holdings for various reasons, including the payment of high dividends. Second, both transient IO and corporate cash holdings are plausibly jointly driven by unobservable missing factors such as a windfall of cash flows. To address endogeneity from these reverse causality and omitted variable bias concerns, we adopt a regression discontinuity design (RDD) based on the Russell 1000/2000 index reconstitutions.[2] The discontinuity in index weights around the Russell 1000/2000 index thresh-

[2] A growing body of literature uses the discontinuity in index weights around the Russell 1000/2000 index cutoffs to correct for endogeneity issues related to institutional ownership (e.g., Appel et al., 2016; Boone and White, 2015; Cremers et al., 2020; Crane et al., 2016).

olds, results in a substantial difference in transient IO that is not related to corporate policies such as cash holdings. Our main finding with the RDD framework confirms that cash holdings indeed increase with transient IO and, hence, provides a degree of comfort on our causal inference.

Furthermore, we investigate how transient IO influences the value effect of corporate cash holdings using the model of Faulkender and Wang (2006). We find that transient IO increases the market valuation of incremental cash holdings. Specifically, our estimation indicates that the value of an extra dollar of cash to shareholders of firms with high (i.e., above-median) transient IO is greater by 76 cents compared to counterpart firms with low (i.e., below-median) transient IO.

To provide extended insights on the positive association between transient IO and corporate cash holdings, we conduct four additional tests. First, we evaluate whether the positive association between transient IO and cash holdings is more relevant for financially constrained firms. Fazzari et al. (1988) and Bates et al. (2009) show that financially constrained firms mainly rely on internal cash reserves or internally generated cash. Almeida et al. (2004) model the link between financial constraints and corporate liquidity and find that financially constrained firms have more cash holdings, induced by the precautionary motive. Faulkender and Wang (2006) note that the variation in the marginal value of cash can be attributed to leverage and the relative tax effects of payout decisions. Denis and Sibilkov (2009) find that greater cash holdings are associated with higher levels of investment for constrained firms with high hedging needs. Further, they find that the association between investment and value is stronger for constrained firms than for unconstrained firms, implying that higher cash holdings allow constrained firms to undertake value-increasing projects that might otherwise be bypassed. As expected, we find that the positive association between transient IO and cash holdings is more acute for financially constrained firms.

Second, we investigate whether the costs of debt and equity increase with transient IO. Sophisticated debtholders will anticipate higher credit risk and/or higher liquidity risk with greater transient IO due to heightened shareholder–debtholder conflicts from short-termism and managerial myopia. Elyasiani et al. (2010) and Kim et al. (2019) find that short-term IO, which is similar to transient IO, is positively associated with the cost of debt. In line with this view of external financing difficulties, our analyses present a positive association between cost of debt and transient IO. However, we observe that the cost of equity decreases with transient IO possibly due to the improved information quality and shareholder supremacy (Yan and Zhang, 2007; Boehmer and Kelley, 2009). These results offer some evidence to support our proposition that costly external financing is an important mechanism driving the positive association between transient IO and cash holdings.

Third, we test whether transient IO is positively associated with the number of debt covenants. Short-termism and managerial myopia associated with transient IO could exacerbate debtholder–shareholder conflicts and, hence, debtholders might attempt to protect their positions by imposing more stringent debt covenants. As expected, we find a positive association between transient IO and the number of debt covenants, indicating that debtholder–shareholder conflicts contribute to higher costs of debt financing with high transient IO.

Finally, we assess whether transient IO is negatively associated with the firm-level stock price crash risk. Transient institutional owners might improve the information environment through their frequent trading and monitoring (Boehmer and Kelley, 2009) and, hence, reduce hoarding bad news, leading to lower stock price crash risk (Haq et al., 2023; Hutton et al., 2009). Consistent with this expectation, we observe that transient IO is negatively related to stock price crash risk.

Our study makes several contributions to the literature. First, our work is the first to show that transient IO is an important determinant of corporate cash holdings. A growing body of literature suggests that institutional ownership can affect corporate policies through either active intervention (voice) or the threat of selling (exit).[3] More specifically, long-term investors such as dedicated institutional investors influence managers to pursue corporate policies through the voice channel (Appel et al., 2016), whereas short-term investors such as transient institutional investors are more associated with the threat of exit. In particular, Borochin and Yang (2017) show that institutional ownership horizons influence firms' corporate governance characteristics and firms' valuation and that dedicated institutions tend to hold the shares of firms with better governance characteristics

[3]See Edmans (2014) for an extensive review of the monitoring through exit and voice channels.

compared to transient institutions. However, past studies have not considered the influence of transient IO on the level and value of corporate cash holdings. This paper contributes to this literature by providing evidence that short-term institutional investors exacerbate debtholder–shareholder conflicts and increase debt financing costs, which affects the level and value of corporate cash holdings.

Second, through a wide range of tests, we are the first to show that the conflict between shareholders and debtholders is the underlying mechanism of the positive association between transient IO and cash holdings. Klein and Zur (2011) find that hedge-fund activism generates positive returns to shareholders and negative returns to bondholders, implying that transient institutional owners, such as hedge funds, expropriate wealth from bondholders. Sunder et al. (2014) show that the spreads of bank loans increase when the hedge-fund activism relies on the market for corporate control or financial restructuring. More directly, Elyasiani et al. (2010) find that short-term institutional ownership is positively associated with the cost of debt, since short-term institutional ownership can hurt creditors and increase credit risks by forcing management to make myopic decisions and exacerbating creditor–shareholder conflicts. In this regard, we provide new evidence that the cost of debt increases with transient IO and that this channel works through aggravated debtholder–shareholder conflicts.

Third, our study contributes to research on the level and value of corporate cash holdings. Previous research shows that the level and value of cash holdings are mainly determined by various factors including: financial constraints (Opler et al., 1999; Faulkender and Wang, 2006; Denis and Sibilkov, 2009); bank power (Pinkowitz and Williamson, 2001); corporate governance (Dittmar et al., 2003; Dittmar and Mahrt-Smith, 2007; Harford et al., 2008); accruals quality (García-Teruel et al., 2009); corporate diversification (Duchin, 2010; Subramaniam et al., 2011; Tong, 2011); CEO risk incentives (Tong, 2010); accounting conservatism (Louis et al., 2012); refinancing risk (Harford et al., 2014); ambiguity (Neamtiu et al., 2014); information asymmetry (Chung et al., 2015); uncertainty (Im et al., 2017); board gender diversity (Atif et al., 2019); strategic deviance from industry peers (Dong et al., 2021); stock liquidity (Nyborg and Wang, 2021; Im et al., 2022);

exchange traded funds (ETF) ownership (Lin et al., 2023); pandemics (Baxamusa and Jalal, 2023); and political conflicts (Im et al., 2023). Our study provides evidence that institutional ownership, particularly transient institutional ownership, is another important force that significantly impacts the level and value of cash holdings. Moreover, given that our work presents evidence that transient institutional ownership increases both the level and value of corporate cash holdings, our results align more closely with an interpretation of external financing costs in which firms with more transient IO have less reliance on costly debt financing.

The paper is organized as follows. Section 2 describes our research design. Section 3 presents our empirical results regarding the effects of transient IO on the level and value of cash holdings and the economic mechanisms underlying such effects. Section 4 concludes the paper.

2 RESEARCH DESIGN

2.1 Sample selection

Our sample comprises 148,508 firm-year observations spanning 16,215 U.S. industrial firms for the period 1981 to 2021. We source financial statement data from Compustat North America, institutional shareholdings data from Thomson Reuters' 13F database, and stock price and returns data from the Center for Research in Security Prices (CRSP) database. We also obtain GDP deflator and corporate bond yields data from Federal Reserve Economic Data (FRED), earnings forecasts and analyst coverage data from I/B/E/S, board characteristics data from BoardEx, bank loan spread and debt covenants data from Dealscan, and institution type data from Brian Bushee's website.

Following convention, we exclude financial services firms (SIC codes between 6,000 and 6,999) and regulated utility firms (SIC codes between 4,900 and 4,999) from our sample because their financing policies are significantly influenced by regulations and government policies. We also avoid firm-year observations for which net assets are negative, the market value of equity is negative, or dividends are negative. We winsorize all variables at the 1st and 99th percentiles to mitigate the effects of outliers.

The sample period for the RDD analysis based on the Russell 1000/2000 index reconstitutions is from 1990 to 2006. Similar to prior studies (e.g., Chen et al., 2019; Crane et al., 2016) based on Russell index reconstitution, the sample period ends in 2006 because a banding rule was introduced in 2007 by FTSE Russell.[4] Since then, FTSE Russell does not move a stock between two indices unless the percentage difference between the company market capitalization and the relevant market capitalization breakpoint exceeds 5%.

2.2 Measuring institutional ownership

We follow Bushee (1998) to classify institutional shareholdings into three mutually exclusive groups: transient, quasi-indexer, and dedicated. Transient institutional owners are defined as institutional owners with high portfolio turnover and diversified portfolio holdings, quasi-indexer institutional owners as those with low turnover and diversified portfolios, and dedicated institutional owners as those with low turnover and more concentrated portfolio holdings. To measure the ownership percentages of three institutional shareholder types, we begin by cross-referencing the institutional shareholder list from Thompson Reuters' 13F database with the publicly available Bushee (1998) institutional shareholders classification dataset. We then calculate dedicated institutional shareholdings as the proportion of total outstanding shares held by dedicated shareholders, quasi-indexer shareholdings as the proportion held by quasi-indexers, and transient shareholdings as the proportion held by transient shareholders of a firm in a year. Appendix A details the Bushee (1998) classification of institutional shareholders that we use.

2.3 Cash holdings model

We estimate the following regression model employed by Opler et al. (1999):

$$CASH_{i,t} = \alpha + \beta IO\_Type_{i,t} + \gamma' \mathbf{X}_{i,t} + FIRM_i + YR_t + \varepsilon_{i,t}, \tag{1}$$

[4] The banding policy likely violates the local continuity condition required for an RDD analysis. Refer to Crane et al. (2016) for details on the banding policy.

where $CASH_{i,t}$ is the ratio of cash and short-term investments to total assets. $IO\_Type_{i,t}$ is firm i's IO of a specific type, i.e., total IO, dedicated IO, quasi-indexer IO, or transient IO in year t, and $\mathbf{X}_{i,t}$ is a vector containing all control variables that could affect firm i's cash-holding decisions in year t.

Broadly in line with prior studies on cash holdings (Opler et al., 1999; Harford et al., 2008, 2014), we include the following set of control variables: 1) net working capital net of cash scaled by book assets ($NWC_{i,t}$), 2) firm size ($SIZE_{i,t}$), measured as real inflation-adjusted book assets , 3) market-to-book assets ($MB_{i,t}$), 4) R&D expenses scaled by sales ($RD_{i,t}$), 5) capital expenditure scaled by book assets ($CAPEX_{i,t}$), 6) an indicator variable for positive dividends ($DIV_{i,t}$), 7) earnings before interests and taxes scaled by book assets ($EBIT_{i,t}$), 8) total debt scaled by book assets ($LEV_{i,t}$), 9) an industry cash flow uncertainty measure ($RISK_{i,t}$), 10) acquisition expenses scaled by book assets ($ACQ_{i,t}$), 11) credit spread ($SPRD_{i,t}$), defined as the difference between BAA and AAA-rated corporate bond yields, 12) net debt issuance scaled by book assets ($NDI_{i,t}$), 13) a dummy variable indicating whether the firm has initial public offering (IPO) activity during the prior five years ($IPO5_{i,t}$), 14) short-term debt scaled by total assets ($STD_{i,t}$), 15) square of $STD_{i,t}$ ($STDSQ_{i,t}$), 16) blockholding ($BLOCK_{i,t}$), measured as the proportion of shares owned by institutional investors with more than 5% of shares outstanding each, and 17) analyst coverage ($ANAL_{i,t}$), measured as the natural logarithm of 1 plus the number of EPS estimates across months within a fiscal year. In some specifications, we also include additional governance measures constructed using the BoardEx database: 1) the number of directors on the board of directors ($BSIZE_{i,t}$), 2) the number of independent directors divided by $BSIZE_{i,t}$ ($INDDR_{i,t}$), and 3) CEO duality, which equals 1 if CEO is also board chairperson and 0 otherwise ($DUAL_{i,t}$). The details for the variables included in the cash holdings models are provided in Appendix B. Additionally, we include firm and year fixed effects to capture unobserved heterogeneity in corporate cash holdings across firms and years.

Guided by the broad literature (e.g., Opler et al., 1999; Harford et al., 2008, 2014; Colla et al., 2018) and informed by theory, the expected effects of control variables on corporate cash holdings are discussed below. Net working capital can act as a substitute for cash, suggesting that firms with higher net working capital tend to hold less cash. Firm size helps account for the information asymmetry faced by smaller firms with external capital providers, potentially leading to larger cash balances. Market-to-book assets and R&D expenses serve as proxies for growth opportunities and information asymmetry regarding a firm's prospects. Firms with significant growth opportunities or higher information asymmetry tend to hold more cash to mitigate underinvestment or higher external financing costs. Capital expenditures proxy for a firm's level of investment. Conversely, higher capital expenditures indicate lower cash reserves, as firms that invest more are expected to accumulate less cash. Firms that pay dividends are expected to have easier access to external capital, hence, holding smaller cash reserves. Firms with higher earnings are less likely to be financially constrained and to hold large cash balances for precautionary motives. The interest payment of firms reduces their ability to accumulate excess cash balances, resulting in a negative impact of leverage on cash holdings. Industry cash flow volatility reflects industry-specific cash flow uncertainties, which can be positively related to cash holdings. Acquisition expenses serve as a proxy for a firm's investment level and can be negatively associated with cash holdings. Default yield spread proxies credit market conditions, and tightening credit conditions prompt firms to increase cash holdings to mitigate refinancing risks. Net debt issuance is also used as a control variable because firms issuing more debt than they retire in a given year can show an increase in their cash balances. Firms with an IPO during the prior five years are more likely to face larger information asymmetry problems, thus leading to larger cash balances. The linear and squared term of short-term debt are included to test a U-shaped relationship between short-term debt and corporate cash holdings, namely, the quadratic coefficient is positive, while the coefficient for the linear term can be negative. Generally, firms with better corporate governance mechanisms tend to hold more cash because in such firms shareholders are more comfortable allowing managers to accumulate excessive cash balances. However, it is also possible that firms with better corporate governance hold less cash due to relaxed financial constraints. Indeed, conflicting predictions as well as the multiple nuances of corporate governance make it difficult to predict the effects of each governance proxy on corporate cash holdings.

2.4 Regression discontinuity design

2.4.1 Issues in identification

We use the annual reconstitution of the Russell 1000 and 2000 indices to identify the causal effect of transient IO on corporate cash holdings. We closely follow the RDD approach employed by Crane et al. (2016). In the RDD approach, assignment to the treatment and control groups is not purely random but instead depends on a known cutoff that is a function of an observable variable called a forcing variable (Roberts and Whited, 2013). This cutoff generates a discontinuity in receiving treatment at that cutoff point. Subjects whose forcing variable is on the "active" side of the cutoff are assigned to the *treatment* group, and those on the other side of the cutoff are assigned to the *control* group.[5] The largest 1,000 stocks are included in the Russell 1000 index, and the next largest 2,000 stocks are in the Russell 2000 index.

Because firms cannot perfectly control their rankings, the assignment of an index ranking close to the cutoff is virtually random.[6] Even if one assumes that a firm could manipulate its own size, it cannot manipulate the sizes of firms that are close to the cutoff, especially when these firms are also manipulating. This quasi-random index assignment induces significant differences in index weights for firms close to the cutoff with tiny differences in firm size. In 2005, the ten smallest firms in the Russell 1000 index had a combined index weight of 0.0004%, and the next ten largest firms in the Russell 2000 index had a combined index weight of 2.3%. These significant differences in index weights around the cutoff create an exogenous shock to transient IO (e.g., Boone and White, 2015).[7]

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[5]In our context, *subjects* are firms within the Russell universe, the *forcing variable* is firm size, and the *cutoff* is the size of a hypothetical firm that might be ranked between the 1000th and 1001st positions in the Russell universe based on market capitalization on the last trading day of May in each year.

[6]An advantageous feature of the RDD is that one need not assume that the cutoff generates randomized variation. Lee (2008) shows that if subjects cannot perfectly manipulate the forcing variable around the likelihood of the cutoff, then randomized variation is in fact a consequence of the RDD.

[7]Several studies (e.g., Im et al., 2024, 2022; Madhavan, 2003; Chang et al., 2014; Dass et al., 2016) suggest that these significant differences in index weights around the cutoff create an exogenous shock to stock liquidity. Given

Our underlying assumption is that transient IO varies around the Russell index threshold because of mechanical weighting differences that are orthogonal to firm characteristics. To satisfy this assumption, assignment to an index cannot be based on corporate liquidity policy or any determinant of corporate liquidity policy outside of its effect on index inclusion. However, the liquidity policies of large firms clearly differ from those of small firms, and index assignment is based on market capitalization rankings. Thus, we need to focus only on variations in a neighborhood close to the threshold in which firms are similar enough that the variation in transient IO is plausibly exogenous to corporate cash holdings.

Notably, the Russell index inclusion setting is not perfectly suited to a simple regression discontinuity design because FTSE Russell makes adjustments to its index construction. First, in 2007, FTSE Russell adopted the banding policy to reduce unnecessary trading arising from changes in index constituents by maintaining some continuity in the indices. The banding policy could render the exclusion restriction to be violated because the selection of firms for inclusion in the Russell 1000 and 2000 indices is not only related to market capitalization rankings but also firm characteristics. Second, FTSE Russell makes a proprietary adjustment based on the available public float (the number of investable shares) to construct the June 30th market capitalization rankings used to determine index weights. One potential problem is that the weights that FTSE Russell uses could be correlated with unobservable firm characteristics given the float adjustment.

As Crane et al. (2016) argue, to satisfy our identification assumptions, we need to ensure that Russell index assignment is solely a function of market capitalization rankings (Condition 1), and that we can identify firms close to the threshold at the time of index inclusion (Condition 2). To satisfy those conditions, we closely follow Crane et al. (2016). To satisfy Condition 1, we drop all years after 2006 because FTSE Russell adopted the banding policy in 2007. We construct the sample from 1991 to 2006. To satisfy Condition 2, we use the May 31st unadjusted market capitalization rankings based on data from CRSP. Firms are assigned to the Russell 1000 and 2000

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that transient institutions are attracted to liquid stocks and transient IO makes stocks more liquid, the Russell index reconstitution can be considered an exogenous shock to both stock liquidity and transient IO. In further analysis we find that when the free float adjustment is controlled, there is much less distinct discontinuity in dedicated and quasi-indexer IO compared to transient IO surrounding the index threshold.

indices at the end of May, but index weights are determined at the end of June. These index assignments and weights hold until the following June.[8] To control for the variation in index weights caused by Russell's float adjustment made at the end of June, we include a proxy for the float adjustment by Russell, computed as the difference between the rank implied by the May 31st market capitalization and the actual rank assigned by Russell in June.

2.4.2 RDD framework

To examine the impact of transient IO on cash holdings, we employ an RDD test in a two-stage least-squares (2SLS) framework. Accordingly, to establish the relevance of the Russell index reconstitution as a source of exogenous variation in transient IO, we estimate the following first-stage regression model:

$$\begin{aligned} IO^{Trans}_{i,t} = {} & \alpha_1 + \beta_1 Russell2000_{i,t} + \gamma_1 Rank_{i,t} + \delta_1 Russell2000_{i,t} \times Rank_{i,t} \\ & + \eta_1 FloatAdj_{i,t} + \theta_1' \mathbf{X}_{i,t} + IND_j + YR_t + \omega_{i,t}, \end{aligned} \tag{2}$$

where $IO^{Trans}_{i,t}$ is transient IO as outlined in Section 2.2, $Russell2000_{i,t}$ is a binary instrumental variable that equals one if firm i is included in the Russell 2000 index in year t and zero otherwise, and $Rank_{i,t}$ is based on the rank implied by firm i's market capitalization within the assigned index as of May 31st. The Russell rank is defined such that the smallest Russell 1000 firm (the largest Russell 2000 firm) has a value of -1 ($+1$), the second smallest Russell 1000 firm (the second largest Russell 2000 firm) has a value of -2 ($+2$), and so forth. The inclusion of $Rank_{i,t}$ and $Russell2000_{i,t} \times Rank_{i,t}$ allows us to control for the mechanical relationship with market capitalization ranking on either side of the threshold and, thus, isolate any discontinuity in transient IO around the threshold, where $Rank_{i,t} = 0$. To control for the variation in index weights caused by Russell's float adjustment made at the end of June, we also include $FloatAdj_{i,t}$, a proxy for the float adjustment by Russell computed as the difference between the rank implied by the May 31st

[8] Refer to Boone and White (2015) and Crane et al. (2016) for a detailed background of the Russell indices.

market capitalization and the actual rank assigned by Russell in June. The vector $\mathbf{X}_{i,t}$ contains various factors that could affect firm i's cash holdings in year t, as discussed in Section 2.3. Year and industry fixed effects are also included.

In the second stage, we model cash holdings for firm i in year t, $CASH_{i,t}$:

$$\begin{aligned} CASH_{i,t} &= \alpha + \beta \widehat{IO_{i,t}^{Trans}} + \gamma Rank_{i,t} + \delta Russell2000_{i,t} \times Rank_{i,t} + \eta FloatAdj_{i,t} \\ &\quad + \theta' \mathbf{X}_{i,t} + IND_j + YR_t + \varepsilon_{i,t}. \end{aligned} \tag{3}$$

The second-stage model includes the instrumented transient IO and the control variables included in the first-stage model. Year and industry fixed effects are also included. Note that $Russell2000_{i,t}$ is not included in the second-stage regression model because it is the instrumental variable in our empirical framework.[9]

2.5 Value of cash holdings model

To examine whether alternative types of IO have different impacts on the market value of cash holdings, we estimate the following model which extends the work pioneered by Faulkender and Wang (2006):

$$\begin{aligned} r_{i,t} - R_{i,t}^{B} &= (\beta_0 + \beta_1 High\_IO_{i,t} + \beta_2 Cash_{i,t-1} + \beta_3 L_{i,t} + \beta_4 BLOCK_{i,t} + \beta_5 ANAL_{i,t}) \times \Delta Cash_{i,t} \\ &\quad + \gamma_1 High\_IO_{i,t} + \gamma_2 Cash_{i,t-1} + \gamma_3 L_{i,t} + \gamma_4 BLOCK_{i,t} + \gamma_5 ANAL_{i,t} \\ &\quad + \eta' \mathbf{X}_{i,t} + IND_j + YR_t + \varepsilon_{i,t}, \end{aligned} \tag{4}$$

where $r_{i,t} - R_{i,t}^{B}$ is the excess annualized stock return for firm i over fiscal year t, computed as firm i's stock return over fiscal year t minus the return on a three-month treasury bill measured in the last month of firm i's fiscal year. The key right-hand side variable is $\Delta Cash_{i,t}$, measured as the change in firm i's cash holdings in fiscal year t scaled by the market value of equity at the

[9] See Crane et al. (2016) for a discussion about how our setting and empirical specification lead to valid assumptions for causal inference given that our setting and empirical specification are almost identical to theirs.

end of fiscal year $t-1$. $High\_IO_{i,t}$ is a dummy variable indicating high IO of a specific type, namely, either total IO, dedicated IO, quasi-indexer IO, or transient IO. The sign and significance of the coefficient on $High\_IO_{i,t} \times \Delta Cash_{i,t}$, i.e., β_1, is our main focus in answering the question of whether total/dedicated/quasi-indexer/transient IO has a significant effect on the contribution of cash holdings to firm value. In particular, we examine whether transient IO has the most significant positive impact on the marginal value of an extra dollar of cash.

As in the aforementioned literature, we include a series of control variables $\mathbf{X}_{i,t}$: the change in earnings before interest expenses and extraordinary items, the change in book assets net of cash and cash equivalents, the change in R&D expenses, the change in interest expenses, the change in dividends, and net financing during the fiscal year. All these variables are scaled by the lagged market value of equity. All of these control variables are the changes in various firm characteristics that could plausibly also affect firm value. Additionally, to control for capital constraints, the interaction terms between lagged cash holdings (scaled by lagged market capitalization) and the change in cash holdings (scaled by lagged market capitalization) and between leverage and the change in cash holdings (scaled by lagged market capitalization) are included together with lagged cash holdings (scaled by lagged market capitalization) and leverage. Similarly, to control for corporate governance, we include the interaction terms between blockholding and the change in cash holdings (scaled by lagged market capitalization) and between analyst coverage and the change in cash holdings (scaled by lagged market capitalization) together with blockholding and analyst coverage. Finally, we include industry and year fixed effects to capture unobserved heterogeneity in excess stock returns across industries and years.

3 EMPIRICAL RESULTS

3.1 Descriptive statistics and correlation analyses

Table 1 presents selected summary statistics for the variables used in our analyses. Panel A reports on all the variables used in our regression models (with blockholding and analyst coverage as governance controls) over the 1981–2021 sample period. Panel B reports on all the variables used in our regression models (including three board characteristics as additional governance controls) over the 1999–2021 sample period. Panel C reports on firms that belong to Russell 1000/2000 indices from 1990 to 2006.

According to Panel A, the mean and median proportions of the shares owned by institutional investors are 43.3% and 34.2%, respectively. Quasi-indexer IO (27.3%) has the highest proportion among the three types of IOs, followed by transient IO (10.1%) and dedicated IO (4.2%). The mean and median values of the cash ratio are 19.8% and 10.6%, respectively.

Scanning Panel B, we see that there are notable distinctions between the two samples. First, the mean and median of the proportions of the shares owned by institutional investors are substantially higher in the more recent and more restricted sample summarized in Panel B. The median and mean are 61.0% and 68.4%, respectively. In that sample, in a pattern matching the bigger sample, quasi-indexer IO (40.3%) has the highest average proportion among the three types of IO, followed by transient IO (15.2%) and dedicated IO (2.6%). Panel B also indicates that the firms in that sample have higher mean and median cash ratios of 22.9% and 13.7%, respectively.

Panel C of Table 1 reports on the RDD sample. Compared to the full sample in Panel A (with the same set of variables), firms in the RDD sample have significantly higher IO proportions (mean=56.2%; median=58.1%). This might be due to the fact that institutional investors are more attracted to the firms that belong to the Russell 1000 and 2000 indices.

[Insert TABLE 1 About Here]

Table 2 presents the number of firm-year observations; the number of unique firms; the sample means of cash holdings ($CASH_{i,t}$); and the sample means of institutional ownership measures ($IO_{i,t}^{Total}$, $IO_{i,t}^{Ded}$, $IO_{i,t}^{Qix}$, and $IO_{i,t}^{Trans}$) by industry (Panel A), according to the 48 Fama–French industry classification, and firm size (Panel B). Panel A shows that there are significant industry variations in both cash ratio and three different types of institutional holdings. Notably, firms in the pharmaceutical products industry have the highest average cash ratio of 51.8%, while the shipping containers industry has the lowest average cash ratio of 4.9%. Firms in fabricated products have the lowest average transient shareholdings, while firms in the coal and telecommunications industries have the highest average transient shareholdings (12.4%). Panel B displays the same metrics organized by three firm size groups based on inflation-adjusted total assets. Here, we observe that as firm size increases, the cash ratio decreases, while total IO, dedicated IO, and quasi-indexer IO increase.

[Insert TABLE 2 About Here]

The sample pair-wise Pearson correlation matrix is presented in Table 3. This table offers some preliminary evidence consistent with our expectations that transient IO ($IO_{i,t}^{Trans}$) is significantly positively correlated with the cash ratio ($CASH_{i,t}$). The correlation matrix also shows that generally the correlation coefficients are not worryingly high, except the correlation coefficient between $STD_{i,t}$ and $STDSQ_{i,t}$ (0.92).[10]

[Insert TABLE 3 About Here]

3.2 Univariate analyses of cash holdings by IO types

Table 4 presents the differences in means and medians of key variables, including the cash ratio, between high-IO and low-IO firms based on total IO (in Panel A), transient IO (in Panel B), quasi-indexer IO (in Panel C), and dedicated IO (in Panel D). Panel A shows that cash ratios of high total IO firms are lower than cash ratios of low total IO firms, and the difference is statistically significant at the 1% level based on a parametric Student's t-test and a nonparametric Wilcoxon rank sum (Mann-Whitney) test.

When we examine the results in Panels B–D more closely, we observe that the negative association between total IO and cash holdings is driven by quasi-indexer IO and dedicated IO as opposed to transient IO. In particular, Panels B and C show that, compared to firms with low-dedicated or low-quasi-indexer IO, the cash ratio is significantly lower for firms with high dedicated IO by 1.3

[10] While the correlation coefficient of 0.92 is considered very high, the highest variance inflation factor (VIF) is 5.8 representing a value that is less than often-used heuristic of 10, indicating that there is no serious multicollinearity problem.

percentage points and for firms with high-quasi-indexer IO by 3.9 percentage points, respectively. Panel D, however, shows that compared to firms with high transient IO, firms with lower transient IO hold less cash by 3.2 percentage points, significant at the 1% level. Thus, our univariate analyses provide strong indicative support for the hypothesis that transient IO is positively associated with corporate cash holdings.

[Insert TABLE 4 About Here]

3.3 Multivariate analyses of the effect of IO types on cash holdings

Table 5 presents firm and year fixed effects (FE) estimates for Equation (1).[11] The model in Panel A includes blockholding and analyst coverage as governance controls, while the model in Panel B includes board characteristics as additional governance controls. Generally, the impacts of transient IO are similar in both panels but the impact is much stronger in Panel B where the size of the estimated coefficient is three times larger (with additional governance controls).

Panel A shows that there are clear countervailing distinctions between transient IO and dedicated and quasi-indexer IOs, producing an insignificant estimated coefficient on total IO (in Column (1)). Transient IO in Column (4) has an estimated coefficient that is positive and significant at the 1% level, opposing the estimated coefficients on dedicated IO (in Column (2)) and quasi-indexer IO (in Column (3)) that are both negative and significant at the 1% level. The magnitude of the estimated coefficient on transient IO is much larger than the coefficients for dedicated and quasi-indexer IOs. Moreover, the impact of transient IO on firm cash holdings is economically non-trivial: a one-standard-deviation increase (0.189) in transient IO is associated with an increase in the cash ratio of 1.84% (=(0.022 $\times$ 0.189)/0.226) compared to its sample standard deviation (0.226). In Column (5), the "kitchen-sink" regression result including all three types of IO is reported. Even with a potential attenuation bias driven by the simultaneous inclusion of multiple IO proxies, the estimated coefficient on transient IO remains significantly positive at the 1% level,

[11] According to Hausman tests, there are significant differences in coefficient estimates from random effects and fixed effects models, justifying the use of fixed effect estimators.

while the estimated coefficient on quasi-indexer IO turns less significant.

[Insert TABLE 5 About Here]

Panel B, with board characteristics as additional governance controls, shows that there are even more detectable distinctions between transient IO and dedicated and quasi-indexer IOs. The estimated coefficient on total IO in Column (1) is positive and statistically significant at 1% level. The positive estimated coefficient on total IO is driven by the transient IO. Further, we note significant positive estimated coefficients on transient IO in the last two columns (Columns (4) and (5)), while the estimated coefficient on dedicated IO is negative and significant (Column (2)) and the estimated coefficient on quasi-indexer IO is insignificant (Column (3)). Moreover, the impact of transient IO on firm cash holdings is economically meaningful: a one-standard-deviation increase (0.113) in transient IO is associated with an increase in the cash ratio of 3.5% (=(0.074 $\times$ 0.113)/0.241) compared to its sample standard deviation (0.241). The result of the kitchen-sink regression in Column (5) shows that the estimated coefficient on transient IO remains significantly positive at the 1% level, while the estimated coefficients on dedicated and quasi-indexer IOs become insignificant. Thus, the kitchen-sink regression results in Column (5) suggest that the impact of transient IO on cash holdings remains positive, controlling for the effects of the other types of IO.

Notably, in both panels of Table 5, the coefficient estimates for all the control variables are generally consistent with the empirical findings of previous studies such as Opler et al. (1999), Harford et al. (2008), and Harford et al. (2014) and the predictions provided in Section 2.3. For instance, the significantly negative estimated coefficients on firm size and leverage indicate that the level of cash holdings is greater for smaller firms and firms with lower leverage. The negative relationship between firm size and the cash ratio is consistent with the prediction that smaller firms have larger cash balances due to the information asymmetry faced by smaller firms with external capital providers, while the negative relationship between leverage and the cash ratio is consistent with the view that higher interest payments required from more leveraged firms reduces their ability to accumulate excess cash balances.

3.4 RDD results

In the first-stage RDD regression (Equation (2)), our focus is β_1, the coefficient on $Russell2000_{i,t}$. Specifically, we examine if the inclusion in Russell 2000 (the index consisting of small cap firms) with higher weights as compared to firms with similar sizes in the Russell 1000 index (the index with large and midcap firms) with miniscule weights produces an exogenous increase in transient IO. That is, we predict that $\beta_1 > 0$. In the second-stage regression (Equation (3)), our main focus is on β in Equation (3), the coefficient on the instrumented transient IO ($\widehat{IO_{i,t}^{Trans}}$), and according to our arguments (that higher transient IO makes debt financing more costly by exacerbating debtholder–shareholder conflicts), we predict that $\beta > 0$.

[Insert TABLE 6 About Here]

Table 6 reports the estimation of Equations (2) and (3) using firm-clustered standard errors in the RDD tests. The odd-numbered columns (i.e., Columns (1), (3), and (5)) report the results for the first-stage regressions using three different bandwidths, i.e., [−250, +250], [−500, +500], and [−750, +750]. Column (1) reports the results for a small bandwidth with 250 firms on each side of the cutoff. The estimated coefficient, $\hat{\beta}_1$, on the Russell 2000 index inclusion is 0.037 and is statistically significant at the 1% level. This effect is economically significant, as the difference in transient IO between the largest firms in the Russell 2000 index and the smallest firms in the Russell 1000 index is 32.5% as large as the standard deviation of transient IO in the RDD sample (0.114). Column (3) (Column (5)) with a more generous bandwidth with 500 (750) firms on each side of the cutoff indicates that the estimated effect, $\hat{\beta}_1$, of the Russell 2000 index inclusion on transient IO is 0.027 (0.013), and this value is statistically significant at the 1% (1%) level. The effect is a little smaller but is still economically significant, as the difference in transient IO between the largest firms in the Russell 2000 index and the smallest firms in the Russell 1000 index is 23.7% (11.4%) as large as the standard deviation of transient IO in the RDD sample (0.114).

Regardless of the choice of bandwidth, Russell 2000 firms around the cutoff have significantly higher transient IO than Russell 1000 firms around the cutoff. The reported point estimates are slightly smaller with larger bandwidth, consistent with the RDD theory that an increasing distance from the cutoff will increase the power of the test but also introduce bias in the estimated treatment effect. Overall, the analyses suggest that the Russell reconstitution serves as a valid exogenous shock to transient IO given the clear evidence of discontinuity in transient IO around the threshold.

The even-numbered columns (i.e., Columns (2), (4), and (6)) report the results for the second-stage regression for the three alternative bandwidths, i.e. $[-250, +250]$, $[-500, +500]$, and $[-750, +750]$. Regardless of the choice of bandwidth, our RDD-based estimate of the impact of transient IO remains positive and significant in all of these even-numbered columns, confirming our main finding in Table 5 that firm cash holdings increase with transient IO. For example, Column (2) shows that $\hat{\beta}$ is positive (0.889) and statistically significant at the 1% level. Moreover, the impact of instrumented transient IO on firm cash holdings is economically significant: A one-standard-deviation increase (0.114) in transient IO is associated with an increase in the cash ratio of 45.4% ($= (0.889 \times 0.114)/0.223$) of its sample standard deviation (0.223), which is much bigger than the effect in Panel A of Table 5. Specifically, a one-standard-deviation increase in transient IO increases the cash ratio from 19.8% to 29.9% ($= 0.198 + 0.889 \times 0.114$), i.e., by about 10 percentage points.

3.5 Subsample analyses

We also conduct additional analysis for pre- and post-GFC balanced subsamples, where the pre-GFC subsample includes observations between 2003 and 2007, while the post-GFC subsample includes observations between 2008 and 2012.[12] The GFC-related analysis is reported in Panel A, Table 7 (pre-GFC versus post-GFC). The estimated coefficient on transient institutional shareholdings remains significantly positive for both pre-GFC and post-GFC periods at 1% level or better. Therefore, we can conclude that the positive association between transient IO and cash ratio is somewhat resilient to any GFC effect.

Further, we examine whether the impact of transient IO on cash holdings varies with the direc-

[12]Note that using balanced subsamples would have some advantages as this will allow us to exclude new firms with different characteristics in the post-GFC subsample.

tion of the change in transient IO ($\Delta IO_{i,t}^{Trans}$), i.e., we compare subsamples of an increase (or no change) in transient IO (i.e., $\Delta IO_{i,t}^{Trans} \geq 0$) versus a decline in transient IO (i.e., $\Delta IO_{i,t}^{Trans} < 0$). The results are reported in Panel B, Table 7. Regardless of whether we control for different types of IOs, the estimated coefficient on transient institutional shareholdings remains significantly positive for both subsamples based on the sign of transient IO changes at 1% level or better. While we find slightly greater coefficients for the firm-years with increased (or unchanged) transient IOs than for the firm-years for decreased transient IOs, the differences are not economically meaningful. Therefore, we can conclude that the positive association between transient IO and the cash ratio is resilient to this type of partitioning of samples.

[Insert TABLE 7 About Here]

3.6 Transient IO and the impact of cash holdings on firm value

The results for Equation (4) related to the value of corporate cash holdings are reported in Table 8. The first model in Panel A is a baseline specification identical to that used in Faulkender and Wang (2006). These baseline results show that the estimated regression coefficient on the change in current-year cash holdings is positive and significant at the 1% level, indicating that the marginal value of an extra dollar of cash is positive. The first column in Panel B uses the regression coefficients from the first column in Panel A to compute the marginal value of a dollar of cash for an average firm, following the procedure used in Faulkender and Wang (2006). According to this baseline analysis a dollar of cash is worth \$1.97, which is somewhat higher than the values reported in Faulkender and Wang (2006) and Im et al. (2017).[13]

[13]The higher value of cash holdings is consistent with Bates et al. (2018), who report that the value of corporate cash holdings has increased significantly in recent decades. Bates et al. (2018) report that \$1 of cash is valued at \$0.584 in 1980 and \$1.342 in 2009. They argue that this increase is predominantly driven by the investment opportunity set and cash flow volatility, as well as secular trends in product market competition, credit market risk, and within-firm diversification. Second, the higher value of cash is consistent with Dittmar and Mahrt-Smith (2007), who show that a firm with better corporate governance (e.g., a firm with higher institutional blockholding) has a higher value of cash holdings. Given that only firms with non-missing Bushee's classification data and 13F institutional ownership data are included, firms in our sample might have larger cash holdings because they have better corporate governance compared to those with missing data.

The second model in Panel A shows that the effect of total IO on the contribution of cash holdings to firm value is positive and significant at the 1% level. The counterpart second column in Panel B, based on Model (2) in Panel A, shows that the marginal value of a dollar of cash is \$2.08 for high (i.e., above-median) total IO firms versus \$1.56 for low (i.e., below-median) total IO firms. Thus, a dollar of cash is 52 cents more valuable to firms with high total IO than to firms with low total IO. This finding is consistent with Dittmar and Mahrt-Smith (2007), who show that a firm with higher institutional blockholdings has a higher marginal value of an extra dollar of cash.

The results in Columns (3) to (5) of Panel A, Table 8 partition out the effects across different types of IO. It is notable that only transient IO has a positive and significant effect on the marginal value of an extra dollar of cash, while dedicated and quasi-indexer IOs have insignificant effects. In the kitchen-sink regression reported in Column (6), quasi-indexer and dedicated IO have negative and significant effects on the marginal value of an extra dollar of cash, while transient IO has a positive and significant effect on the marginal value of an extra dollar of cash. These results are consistent with the univariate comparisons reported in Section 3.2. The magnitude of transient IO on the value of cash holdings in the kitchen-sink regression is much stronger than that in Column (5). Column (5) of Panel B, based on the regression result in Column (5) of Panel A, reports the marginal value of a dollar of cash for firms with high versus low transient IO. The marginal value of a dollar of cash is \$2.07 for firms with high (i.e., above-median) transient IO versus \$1.31 for firms with low (i.e., below-median) transient IO. Thus, an extra dollar of cash is 76 cents more valuable to firms with high transient IO than to firms with low transient IO. Notably, transient IO influences the marginal value of cash holdings more significantly than total IO does, implying that transient IO is the main driver of the positive effect of total IO.[14]

[Insert TABLE 8 About Here]

[14] We observe similar results when we use different benchmark returns (e.g., returns on Fama and French's 5×5 size and book-to-market value-weighted portfolios). The details are available from the authors upon request.

3.7 Financial constraints and the effect of transient IO on cash holdings

Financially constrained firms face limited access to external financing sources and depend heavily on internal funds (Opler et al., 1999; Almeida et al., 2004; Faulkender and Wang, 2006; Denis and Sibilkov, 2009). Therefore, we contend and test whether financially constrained firms with greater transient IO hold more cash compared to unconstrained counterpart firms to avoid passing up positive NPV projects. In this regard, Table 9 presents the results related to the nature of impact of financial constraints on the association between transient IO and cash holdings. Following Almeida et al. (2004), Faulkender and Wang (2006), and Denis and Sibilkov (2009), we use four firm-specific characteristics to measure a priori financial constraints: firm size, annual payout ratio, bond rating, and paper rating. The first two measures are based on 'size' measured as the book value of total assets and 'payout ratio' measured as the ratio of dividends and common stock repurchases to operating income. We rank firms based on their size and payout ratios and classify firms in the bottom tercile as being financially constrained. The third and fourth measures are based on 'paper rating' and 'bond rating'.[15] We classify firms that do not have a Standard & Poor's short- or long-term debt rating or belong to a default category as financially constrained. In addition, we use the Kaplan and Zingales (1997) index (KZ index), Whited and Wu (2006) index (WW index), and Hadlock and Pierce (2010) index (SA index) as measures of financial constraints. Specifically, for each case we classify firms with an index in the upper tercile as financially constrained.

[Insert TABLE 9 About Here]

Table 9 reports the results of the regressions designed to examine the effects of transient IO, a financial constraint dummy, and their interaction on cash holdings. Regardless of the chosen financial constraint proxy, the estimated coefficient on transient IO is significantly positive, suggesting that cash holdings increase with transient IO for financially unconstrained firms. More importantly, the estimated coefficient on the interaction term is also positive and significant at the 1% level irrespective of the chosen financial constraint proxy, implying that the positive effect of transient IO

[15] Note that both ratings measures from Compustat North America are only available until February 2017.

on cash holdings is even more pronounced for financially constrained firms. These results sustain with the inclusion of a full set of controls including three board characteristic variables ($BSIZE_{i,t}$, $INDDR_{i,t}$, and $DUAL_{i,t}$), although we obtain less significant results.[16]

3.8 Further financial effects of transient IO

In this subsection, we explore some interesting potential economic mechanisms that might help shed further reinforcing light on the nexus between transient IO and corporate cash holdings. To this end, we estimate panel regression models to directly test how transient IO influences 1) the costs of debt and equity capital, 2) debtholder–shareholder conflicts, or 3) stock price crash risk:

$$Y_{i,t} = \beta_0 + \beta_1 IO_{i,t}^{Trans} + \beta_2' \mathbf{X}_{i,t} + FIRM_i + YR_t + \varepsilon_{i,t}, \tag{5}$$

where $Y_{i,t}$ is the cost of debt or equity capital, a proxy for debtholder–shareholder conflicts, or one of four alternative stock price crash risk proxies as described shortly, $IO_{i,t}^{Trans}$ is transient IO as outlined in Section 2.2, and $\mathbf{X}_{i,t}$ is a vector containing all control variables that could affect firm i's external financing costs and cash holdings in fiscal year t. The definitions of the control variables are provided earlier and in Appendix B. Additionally, we include firm and year fixed effects.

[Insert TABLE 10 About Here]

The estimation outcome for Equation (5) is presented in Table 10. We first examine the effects of transient IO on the cost of debt and debt–shareholder conflicts. The first column in Panel A shows that the estimated coefficient on transient IO is significantly positive at the 1% level or better. Moreover, the impact of transient IO on $COD_{i,t}$ is economically meaningful: a one-standard-deviation increase (0.113) in transient IO is associated with an increase in $COD_{i,t}$ of 1.9% (=(0.237 × 0.113)/1.407) compared to its sample standard deviation (1.407). This suggests that companies with high transient IO face higher costs of debt financing.

[16]We report Huber–White robust standard errors. The results with firm-clustered standard errors are similar but the coefficients are slightly less significant.

Further, we investigate the underlying mechanism driving this positive association between transient IO and the cost of debt. Transient IO could exacerbate the agency conflicts between debtholders and shareholders because transient institutional owners might force firm managers to take unreasonably myopic actions. If transient IO exacerbates debtholder–shareholder agency conflicts, financing by debt will be more costly for firms with greater transient IO. In this regard, Kim et al. (2019) show that short-term (long-term) IO is positively (negatively) related to the number of debt covenants. Our transient IO measure could be positively correlated with the short-term IO measure used in Kim et al.'s (2019) study, but it is not clear whether the associations between each of these two IO measures and the number of debt covenants are aligned. Hence, we test whether our measure of transient IO is positively associated with the number of debt covenants as a proxy of debtholder–shareholder conflicts.

As shown in Panel B of Table 10, consistent with our conjecture, the estimated coefficient on transient IO is positive and statistically significant at the 1% level or better for the number of debt covenants ($NCOV_{i,t}$) as a proxy of debt–shareholder conflicts. Moreover, the impact of transient IO on $NCOV_{i,t}$ is economically meaningful: a one-standard-deviation increase (0.113) in transient IO is associated with an increase in $NCOV_{i,t}$ of 2.8% (=(0.244 $\times$ 0.113)/0.989) compared to its sample standard deviation (0.989).

This finding is consistent with previous empirical studies such as Elyasiani et al. (2010) and Kim et al. (2019) who document that short-term IO is positively associated with debtholder–shareholder conflicts as measured by the cost of debt and the number of debt covenants. Sunder et al. (2014) also show that the spreads on bank loans increase when the hedge-fund activism relies on the market for corporate control or financial restructuring. Thus, this finding substantiates our claim that transient IO increases credit risks by forcing management to make myopic decisions and exacerbating debtholder–shareholder conflicts.

With regard to the cost of capital, the second column in Panel A shows that the estimated coefficient on transient IO is significantly negative at the 1% level or better. Moreover, the impact of transient IO on $COE_{i,t}$ is economically meaningful: a one-standard-deviation increase (0.113) in transient IO is associated with a decline in $COE_{i,t}$ of -5.3% (=(-5.717×0.113)/12.185) compared to its sample standard deviation (12.185). The results imply that firms with greater transient IO enjoy a lower cost of equity financing.

Although the reduction of the cost of equity on its own appears to contradict our standpoint that external financing is costly for firms with high transient IO, it is consistent with the informational role of transient IO. Prior literature shows that transient institutional owners can be better informed. For example, Yan and Zhang (2007) report that short-term institutional trading forecasts future stock returns and is positively related to future earnings surprise, while long-term institutional trading does not forecast future returns, nor is it related to future earnings news. Boehmer and Kelley (2009) also show that stocks with greater institutional ownership are priced more efficiently through institutional trading activity, even when institutions trade passively. In addition, transient institutional owners who prefer to hold liquid shares can offload their ownership blocks without incurring significant costs (Yan and Zhang, 2007). Klein and Zur (2011) also find that hedge fund activism generates positive returns to shareholders and negative returns to bondholders, implying that transient institutional investors such as hedge funds expropriate wealth from bondholders though shareholder activism. Thus, the cost of equity decreases with transient IO due to improved information quality and shareholder supremacy.

To investigate the above conjecture that transient IO enhances firms' information environment, we test whether crash risk decreases with transient IO. Better monitoring with transient IO decreases managerial bad-news hoarding, which results in lower stock price crash risk. Crash risk is generally higher for firms with information opacity as the accumulated bad news is finally released at once (Haq et al., 2023; Hutton et al., 2009). Columns (1)–(4) of Panel C present the regression results. The dependent variables are: $NCSKEW_{i,t}$, which is the negative conditional skewness of firm-specific weekly returns (Column (2)); $DUVOL_{i,t}$, which is down-to-up volatility calculated as the natural logarithm of the ratio of the standard deviation of firm-specific weekly returns in down weeks to that in up weeks (Column (3)); $EXTRASIG_{i,t}$, which is minus one multiplied by the worst deviation between the firm-specific weekly return and the annual mean divided by the standard deviations of the firm-specific weekly return over the year (Column (4)); and $COUNT_{i,t}$, which is the number of crashes minus the number of jumps over the fiscal year (Column (5)), where a crash (jump) occurs when the firm-specific weekly return is 3.09 standard deviations below (above) its mean over the year. The details for the crash risk measures are also provided in Appendix C.

The estimated coefficients on transient IO in Panel C are significantly negative at the 1% level or better. Moreover, the impacts of transient IO on crash risk proxies are economically meaningful. For example, a one-standard-deviation increase (0.113) in transient IO is associated with a decrease in $NCSKEW_{i,t}$ of -13.1% (=(-1.397×0.113)/1.202) compared to its sample standard deviation (1.202). The significant estimated coefficients on transient IO across all four crash risk proxies in Columns (1)–(4) provide evidence that transient IO is negatively associated with stock price crash risk. Hence, these results confirm our proposition that transient IO makes equity financing cheaper by improving the information environment resulting in decreased stock price crash risk.

3.9 Two-stage least squares (2SLS) estimation of cash value regressions

To improve the power of tests for whether alternative types of IO have different impacts on the market value of cash holdings, we estimate the following simultaneous regression equations using a 2SLS estimator:

$$\begin{aligned} \Delta Cash_{i,t} &= a + b\Delta IO\_Type_{i,t} + c'\Delta \mathbf{X_1}_{i,t} + IND_j + YR_t + \xi_{i,t}; & (6) \\ r_{i,t} - R^B_{i,t} &= \beta \widehat{\Delta Cash}_{i,t} + \eta' \mathbf{X_2}_{i,t} + IND_j + YR_t + \varepsilon_{i,t}. & (7) \end{aligned}$$

The variables in the first-stage equation are defined as follows: $\Delta Cash_{i,t}$ is measured as the change in firm i's cash holdings in fiscal year t scaled by the market value of equity at the end of fiscal year $t-1$; $IO\_Type_{i,t}$ is firm i's IO of a specific type, i.e., dedicated IO, quasi-indexer IO, or transient IO in year t; and $\Delta \mathbf{X_1}_{i,t}$ is a vector containing the first-differences of all control variables that could affect firm i's cash-holding decisions in year t (i.e., the same controls used in Table 5 Panel B). The variables in the second-stage equation are defined as follows: $r_{i,t} - R^B_{i,t}$ is the excess annualized stock return for firm i over fiscal year t, computed as firm i's stock return over fiscal year t minus the return on a three-month treasury bill measured in the last month of firm i's fiscal year; the key right-hand side variable is $\widehat{\Delta Cash_{i,t}}$, measured as the first-stage fitted value of the change in firm i's cash holdings in fiscal year t scaled by the market value of equity at the end of fiscal year $t-1$; and $\mathbf{X_2}_{i,t}$ denotes a series of control variables used by Faulkender and Wang (2006) (i.e., the change in earnings before interest expenses and extraordinary items, the change in book assets net of cash and cash equivalents, the change in R&D expenses, the change in interest expenses, the change in dividends, and net financing during the fiscal year). All these variables are scaled by the lagged market value of equity. All control variables are the changes in various firm characteristics that might also affect firm value.[17] We include industry and year fixed effects in both first-stage and second-stage equations.

[Insert TABLE 11 About Here]

The 2SLS estimation results reported in Table 11 are highly consistent with our cash value regression results reported in Table 8. The first-stage model in Column (1) include the first difference of transient IO ($\Delta IO^{Trans}_{i,t}$) only, while the first-stage model in Column (3) include the first differences of the two other types of IO ($\Delta IO^{Ded}_{i,t}$ and $\Delta IO^{Qix}_{i,t}$). In both models, $\Delta IO^{Trans}_{i,t}$ has a significant and positive effect on the change in firm i's cash holdings in fiscal year t scaled by the market value of equity at the end of fiscal year $t-1$ ($\Delta Cash_{i,t}$). Notably, Column (3) shows that, compared to $\Delta IO^{Ded}_{i,t}$ or $\Delta IO^{Qix}_{i,t}$, $\Delta IO^{Trans}_{i,t}$ has a more significant influence over $\Delta Cash_{i,t}$. The second-stage models in Columns (2) and (4) both show that the fitted value of the change in firm i's cash holdings in fiscal year t scaled by the market value of equity at the end of fiscal year $t-1$ ($\widehat{\Delta Cash_{i,t}}$) significantly increases the excess annualized stock return for firm i over fiscal year t ($r_{i,t} - R^B_{i,t}$).

These results show that the change in transient IO positively drives the change in current-year cash holdings (as a proportion of the lagged market value of equity), and that the change in current-

[17] To focus on the effect of transient IO without unnecessary complications, the 2SLS specification does not include the interaction terms between the change in cash holdings (scaled by lagged market capitalization) and other variables.

year cash holdings generated by the change in transient IO increases the marginal value of an extra dollar of cash. Notably, (the change in) transient IO influences (the change in) current-year cash holdings more significantly than does dedicated IO or quasi-indexer IO.

4 CONCLUSION

Over the past four decades, we observe a sharp rise in both transient IO and cash holdings in U.S. firms. In this paper, we have examined whether and to what extent transient IO explains the variation in corporate cash holdings. Compared to long-term institutional owners, transient institutional owners are short-term oriented, weaker monitors, and, thus, encourage managerial myopia. We argue that transient IO amplifies debtholder–shareholder conflicts and, hence, firms with high transient IO will hold more cash to abate difficulty in securing debt financing. Indeed, we find robust evidence that corporate cash holdings increase with transient IO. Our evidence is robust to a variety of alternative tests including a strong identification technique, namely, the regression discontinuity design applied to the Russell 1000/2000 index annual reconstitutions to capture an exogenous change in transient IO.

We also showcase three nuanced outcomes within our analysis to substantiate our proposition that the positive association between transient shareholdings and cash holdings is due to heightened debtholder–shareholder conflicts despite improved transparency. First, we show that the value of an extra dollar of cash to shareholders of a firm with high transient IO is larger by 76 cents compared to firms with low transient IO. Second, we provide direct evidence of our conjecture by documenting that both the cost of debt and the number of debt covenants increase with transient IO. Finally, our results that both the cost of equity and stock price crash risk decrease with transient IO provide support for the view that transient institutional owners improve information quality through their trading which contributes to their incentives not to hoard bad news.

In summary, our contribution to the cash holding literature rests on demonstrating that transient institutional shareholding is a crucial factor in determining corporate cash holdings. We provide extensive evidence supporting the argument that this relationship is driven by heightened conflicts between debtholders and shareholders, leading to increased costs of debt financing. In contrast, on a positive note, we also find that transient institutional shareholding is associated with reduced costs of equity financing and decreased stock price crash risk, indicating an improved information environment. Therefore, our study reveals a mix of both beneficial and detrimental aspects of transient institutional shareholdings. With a balanced and nuanced appreciation, we can offer practical guidance that takes into account the complexities of transient institutional shareholding.

Our work offers a foundation and pathway for research expansion along several lines of enquiry. For example, it is worth exploring the relationship between transient institutional ownership and corporate cash reserves at the national level. Prior investigations demonstrate that conflicts between debtholders and shareholders vary significantly across countries, influenced by the legal frameworks within each jurisdiction (Morellec et al., 2018). Therefore, investigating whether transient institutional investors influence a firm's cash management policies through country-level legal oversight in a cross-country analysis holds substantial promise for future research endeavours. Additionally, a prospective avenue for exploration lies in examining how transient institutional ownership impacts the composition of a firm's cash reserves. Duchin et al. (2017) and Cardella et al. (2021) already delve into the determinants of corporate cash holdings composition. It is plausible that the involvement of transient institutional investors helps shape the composition of corporate cash reserves amidst debtholder–shareholder conflicts. Shedding light on this aspect of corporate financial policy will undoubtedly further enrich our understanding of the nuanced role played by transient institutional investors.

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DATA AVAILABILITY STATEMENT

The data used in this study are available from the first author (Hyun Joong Im) upon reasonable request.

APPENDIX

A Categorizing institutional shareholdings into three alternative types: Dedicated, quasi-indexer, and transient IOs

Bushee (1998) uses a factor analysis and cluster analysis to classify institutional investors into the three groups (dedicated, quasi-indexer, and transient) based on their past investment behaviour. Specifically, Bushee uses four proxies (*CONC*, *APH*, *LBPH*, and *HERF*) to measure the level of portfolio diversification of each institution, two proxies (*STAB* and *PT*) for the degree of portfolio turnover of the institution, and three proxies ($CETS1$, $CETS2$, and $CETS3$) to measure the institution's trading sensitivity to current earnings. Table 5 on page 325 of Bushee (1998) provides the definitions of these nine variables which is reproduced in Table A.1.

[Insert TABLE A.1 About Here]

Bushee (1998) conducts a principal factor analysis with an oblique rotation to identify common factors and calculate standardized factor scores. These scores are then used in a k-means cluster analysis to classify firms into three groups.

The factor analysis reveals three common factors: *BLOCK*, *PTURN*, and *MOMEN*. The *BLOCK* factor indicates the average size of an institution's stake in its portfolio firms. High

BLOCK scores denote larger average investments, while low scores signify smaller investments. The *PTURN* factor measures portfolio turnover, with high scores indicating more frequent trading and low scores indicating less frequent trading. The *MOMEN* factor reflects trading sensitivity to current earnings news, with high scores indicating momentum trading and low scores indicating contrarian trading.

Subsequently, a *k*-means cluster analysis of the standardized factor scores separates institutions into three groups: transient, dedicated, and quasi-indexer. Transient institutions have the highest turnover (*PTURN*) and momentum (*MOMEN*) strategies, along with relatively high diversification (small *BLOCK*). Dedicated institutions show high concentration, low turnover, and little trading sensitivity to current earnings (average *MOMEN* near zero). Quasi-indexers exhibit high diversification and low turnover, resembling index-type, buy-and-hold behaviour. They also demonstrate contrarian-trading tendencies (low *MOMEN*), consistent with buy-and-hold value strategies.

B Definition of regression variables

Table B.1 presents variable definitions and data sources for the variables included in our main regression models.

[Insert TABLE B.1 About Here]

C Stock price crash risk measures

We employ four commonly used stock price crash risk measures: 1) negative conditional return skewness ($NCSKEW_{i,t}$), 2) down-to-up volatility ($DUVOL_{i,t}$), 3) extra sigma ($EXTRASIG_{i,t}$), and 4) crash count ($COUNT_{i,t}$).[18] For all four measures of stock price crash risk, larger values indicate higher crash risk. All are based on residuals from the following model:

$$r_{i,w} = \alpha^i + \beta_1^i r_{m,w-2} + \beta_2^i r_{m,w-1} + \beta_3^i r_{m,w} + \beta_4^i r_{m,w+1} + \beta_5^i r_{m,w+2} + \varepsilon_{i,w}, \tag{8}$$

[18]Fore more details for the measurement of stock price crash risk, see Habib et al. (2018) and Chowdhury et al. (2020) among others.

where $r_{i,w}$ is the return on stock i in week w and $r_{m,w}$ is the return on the CRSP value-weighted market index in week w. We compute firm-specific weekly returns, $W_{i,w}$, for firm i in week w as the natural logarithm of one plus the residual term, $\varepsilon_{i,w}$, of equation (8).

The first measure, $NCSKEW_{i,t}$, is the ratio of the third central moment of firm-specific weekly returns to the standard deviation of firm-specific weekly returns raised to the 3rd power, multiplied by -1, as shown below:

$$NCSKEW_{i,t} = -\frac{n(n-1)^{\frac{3}{2}}\Sigma W_{i,w}^{3}}{(n-1)(n-2)(\Sigma W_{i,w}^{2})^{\frac{3}{2}}}, \tag{9}$$

where n is the total number of firm-specific weekly returns ($W_{i,w}$) during year t. A negative sign is put in front of the skewness so that a higher $NCSKEW_{i,t}$ corresponds to a more negative-skewed stock return distribution, namely, a higher stock price crash risk.

The second measure, $DUVOL_{i,t}$, is calculated as follows. First, for each firm i in year t, we identify the 'down' weeks when the firm-specific weekly returns ($W_{i,w}$) are below the annual mean. Next, using these 'down' weeks, we calculate the standard deviation for each firm i in year t. Second, we identify 'up' weeks and calculate the standard deviation for each firm i in year t when $W_{i,w}$ is above the annual mean. Finally, we compute $DUVOL_{i,t}$ as the natural logarithm of the ratio of the standard deviations of 'down' weeks to 'up' weeks.

$$DUVOL_{i,t} = log\left(\frac{\sigma_{W_{i,w}^{DOWN}}}{\sigma_{W_{i,w}^{UP}}}\right). \tag{10}$$

The third measure, $EXTRASIG_{i,t}$, represents to what extent the worst weekly return of a year falls below the mean weekly return of that year. Specifically, it measures by how many standard deviations the worst weekly return falls below the mean weekly return. $EXTRASIGMA_{i,t}$ is measured as:

$$EXTRASIG_{i,t} = -\min_{w}\left(\frac{W_{i,w} - \overline{W}_{i,t}}{s_{i,t}}\right), \tag{11}$$

where $\overline{W}_{i,t}$ and $s_{i,t}$ are the sample mean and standard deviation of $W_{i,w}$ over the year t.

The fourth measure, $COUNT_{i,t}$, is defined as the number of crashes minus the number of jumps for each firm i during year t. A crash (jump) occurs when the firm-specific weekly return ($W_{i,w}$)

falls 3.09 standard deviations below (above) the annual mean. $COUNT_{i,t}$ is defined as the number of crashes minus the number of jumps for the year.

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TABLE A.1 Institutional investor characteristics

Variable	Definition
Portfolio concentration (*CONC*)	$\sum w_{kt}/NSTK_t$
Average percentage holding (*APH*)	$(\sum w_{kt} PH_{kt}/\sum w_{kt})$
Percent held in large blocks (*LBPH*)	$(\sum w_{kt} LB_{kt}/\sum w_{kt})$
Herfindahl measure of concentration (*HERF*)	$ln(\sum PH_{kt}^2)$
Stability of holdings (percent held for two years) (*STAB*)	$(\sum w_{kt} LT_{kt}/\sum w_{kt})$
Portfolio turnover (*PT*)	$\sum \lvert\Delta w_{kt}\rvert/(\sum w_{kt} + \sum w_{k,t-1})$
Trading sensitivity to current earnings (*CETS*1)	$(\sum \Delta w_{kt} RWE_{kt})/\sum \lvert\Delta w_{kt}\rvert$
Average earnings change of firms bought vs. firms sold (*CETS*2)	$Avg.(RWE_{kt}\lvert\Delta w_{kt} > 0) - Avg.(RWE_{kt}\lvert\Delta w_{kt} < 0)$
Change in holdings in firms with positive earnings vs. firms with negative earnings (*CETS*3)	$[(\sum \Delta w_{kt}\lvert RWE_{kt} > 0) - (\sum \Delta w_{kt}\lvert RWE_{kt} < 0)]/\sum \lvert\Delta w_{kt}\rvert$

Note: This table lists the set of investor characteristics and their definitions. All characteristics are calculated at the end of each calendar quarter for every institution on the Thomson Reuters Institutional (13F) Holdings database. The quarterly values are averaged over all quarters available for the calendar year to get end-of-year average values of each characteristic for each institution. These average values are used in the subsequent factor and cluster analyses. The above-mentioned variables are defined as follows:

$NSTK_t$ =number of stocks owned by institution at end of quarter t;

w_{kt} =portfolio weight (shares held times stock price) in firm k at end of quarter t;

$\Delta w_{kt} = w_{kt} - w_{k,t-1}$;

PH_{kt} =percentage of total shares in firm k held by institution at end of quarter t;

$LB_{kt} = 1$ if $PH_{kt} > 0.05$, 0 otherwise;

$LT_{kt} = 1$ if institution held firm k continuously for prior eight quarters, 0 otherwise;

and RWE_{kt} =seasonal random walk change in quarterly earnings per share of firm k for quarter t (deflated by sales for quarter $t-4$).

TABLE B.1 Variable definitions and data sources

Variable	Definition	Source
Dependent variable		
$CASH_{i,t}$	Cash ratio defined as cash and short-term investments to total assets	Compustat
Institutional ownership variables		
$IO_{i,t}^{Total}$	Percentage ownership of institutional investors	Thomson Reuters Institutional (13F) Holdings database
$IO_{i,t}^{Ded}$	Percentage ownership of dedicated institutional investors. Following Bushee (1998) and Bushee (2001), dedicated investors are defined as investors with low portfolio turnover and concentrated portfolios. (See Appendix A for details.)	Brian Bushee's webpage and 13F database
$IO_{i,t}^{Qix}$	Percentage ownership of quasi indexers. Following Bushee (1998) and Bushee (2001), quasi indexers have low portfolio turnover and diversified portfolios. (See Appendix A for details.)	Brian Bushee's webpage and 13F database
$IO_{i,t}^{Trans}$	Percentage ownership of transient institutional investors. Following Bushee (1998) and Bushee (2001), transient investors have high portfolio turnover and diversified portfolios. (See Appendix A for details.)	Brian Bushee's webpage and 13F database
Control variables		
$NWC_{i,t}$	Non-cash net working capital scaled by total assets	Compustat
$SIZE_{i,t}$	Firm size, defined as inflation-adjusted total assets, where GDP deflator (Base year: 2012) was used to adjust inflation	Compustat and Federal Reserve Economic Data (FRED)
$MB_{i,t}$	Market-to-book assets, defined as market value of assets to book value of assets	Compustat
$RD_{i,t}$	R&D intensity, measured as research and development expenditures scaled by sales	Compustat
$CAPEX_{i,t}$	Capital expenditures scaled by total assets	Compustat
$DIV_{i,t}$	Dividend payer dummy, defined as an indicator variable set to 1 if firm pays dividends and 0 otherwise	Compustat
$EBIT_{i,t}$	Operating profitability, measured as earnings before interests, taxes, and depreciation (EBITDA) plus research and development and advertising expenses	Compustat
$LEV_{i,t}$	Book leverage ratio, defined as the ratio of total debt to total assets	Compustat
$RISK_{i,t}$	Industry cash flow risk, defined as standard deviation of industry cash flow to firm's total assets	
$ACQ_{i,t}$	Acquisition expenses scaled by total assets	Compustat
$SPRD_{i,t}$	Difference between BAA- and AAA-rated corporate bond yields	FRED
$NDI_{i,t}$	Net debt issuance scaled by total assets	Compustat
$IPO5_{i,t}$	Recent initial public offering (IPO) dummy, defined as an indicator variable identifying whether a firm had an IPO during the prior five years	Compustat
$STD_{i,t}$	Short-term debt scaled by total assets	Compustat
$STDSQ_{i,t}$	Square of STD	Compustat
$BLOCK_{i,t}$	Blockholding, measured as the proportion of shares owned by institutional investors with more than 5% of shares outstanding each	13F database
$ANAL_{i,t}$	Analyst coverage, measured as the natural logarithm of 1 plus the number of EPS estimates across months within a fiscal year	I/B/E/S
$BSIZE_{i,t}$	Board size, defined as the number of directors on the board of directors	BoardEx
$INDDR_{i,t}$	Proportion of independent directors, calculated as the number of independent directors divided by board size	BoardEx
$DUAL_{i,t}$	CEO duality dummy, which equals 1 if CEO is also board chairperson and 0 otherwise	BoardEx
Other variables		
$COD_{i,t}$	Syndicated bank loans' all-fees-in spread	Dealscan
$COE_{i,t}$	Pástor et al.'s (2008) implied cost of equity capital measure, defined as the internal rate of return that equates the present value of future dividends with the current stock price. Future dividends are calculated based on the earnings forecast information from the I/B/E/S database.	CRSP and I/B/E/S
$NCOV_{i,t}$	The average number of covenants in loan packages	Dealscan
$NCSKEW_{i,t}$	The negative conditional skewness of firm-specific weekly returns (See Appendix C for details.)	CRSP
$DUVOL_{i,t}$	Down-to-up volatility, calculated as the natural logarithm of the ratio of the standard deviation of firm-specific weekly returns in down weeks to that in up weeks (See Appendix C for details.)	CSRP
$EXTRASIG_{i,t}$	Minus one multiplied by the worst deviation between the firm-specific weekly return and the annual mean divided by the standard deviations of the firm-specific weekly return over the year (See Appendix C for details.)	CRSP
$COUNT_{i,t}$	The number of crashes minus the number of jumps over the fiscal year, where a crash (jump) occurs when the firm-specific weekly return is 3.09 standard deviations below (above) its mean over the year (See Appendix C for details.)	CRSP

Note: This table provides variable definitions and their associated data sources.

TABLE 1 Summary statistics

Panel A. Regression sample with blockholding and analyst coverage as governance controls

Variable	Obs.	Mean	S.D.	P5	P25	Median	P75	P95
Dependent variable								
$CASH_{i,t}$	148,508	0.198	0.226	0.005	0.031	0.106	0.285	0.718
Institutional ownership variables								
$IO^{Total}_{i,t}$	148,508	0.433	7.519	0.006	0.108	0.342	0.667	0.958
$IO^{Ded}_{i,t}$	148,508	0.042	7.500	0.000	0.000	0.000	0.014	0.119
$IO^{Qix}_{i,t}$	148,508	0.273	0.435	0.002	0.063	0.212	0.438	0.694
$IO^{Trans}_{i,t}$	148,508	0.101	0.189	0.000	0.008	0.061	0.155	0.316
Control variables								
$NWC_{i,t}$	148,508	0.076	0.201	-0.235	-0.040	0.062	0.203	0.416
$SIZE_{i,t}$	148,508	5.592	2.128	2.339	4.050	5.444	7.021	9.332
$MB_{i,t}$	148,508	1.753	1.682	0.489	0.806	1.187	1.985	5.062
$RD_{i,t}$	148,508	0.310	1.425	0.000	0.000	0.002	0.073	0.908
$CAPEX_{i,t}$	148,508	0.062	0.068	0.004	0.019	0.040	0.078	0.201
$DIV_{i,t}$	148,508	0.400	0.490	0.000	0.000	0.000	1.000	1.000
$EBIT_{i,t}$	148,508	-0.002	0.247	-0.487	-0.026	0.062	0.118	0.225
$LEV_{i,t}$	148,508	0.230	0.216	0.000	0.033	0.191	0.357	0.641
$RISK_{i,t}$	148,508	2.031	4.206	0.050	0.143	0.443	1.769	10.705
$ACQ_{i,t}$	148,508	0.022	0.058	0.000	0.000	0.000	0.007	0.147
$SPRD_{i,t}$	148,508	0.010	0.005	0.006	0.007	0.010	0.012	0.019
$NDI_{i,t}$	148,508	0.010	0.098	-0.119	-0.018	0.000	0.021	0.197
$IPO5_{i,t}$	148,508	0.199	0.399	0.000	0.000	0.000	0.000	1.000
$STD_{i,t}$	148,508	0.050	0.088	0.000	0.001	0.014	0.055	0.231
$STDSQ_{i,t}$	148,508	0.010	0.036	0.000	0.000	0.000	0.003	0.054
$BLOCK_{i,t}$	148,508	0.152	0.250	0.000	0.000	0.095	0.235	0.470
$ANAL_{i,t}$	148,508	1.521	1.678	0.000	0.000	0.693	3.045	4.431

Panel B. Regression sample with board characteristics as additional governance controls

Variable	Obs.	Mean	S.D.	P5	P25	Median	P75	P95
Dependent variable								
$CASH_{i,t}$	46,807	0.229	0.241	0.006	0.043	0.137	0.340	0.771
Institutional ownership variables								
$IO^{Total}_{i,t}$	46,807	0.610	0.326	0.037	0.345	0.684	0.874	1.018
$IO^{Ded}_{i,t}$	46,807	0.026	0.069	0.000	0.000	0.000	0.014	0.138
$IO^{Qix}_{i,t}$	46,807	0.403	0.244	0.016	0.189	0.430	0.599	0.756
$IO^{Trans}_{i,t}$	46,807	0.152	0.113	0.002	0.062	0.138	0.222	0.353
Control variables								
$NWC_{i,t}$	46,807	0.045	0.175	-0.228	-0.050	0.037	0.145	0.340
$SIZE_{i,t}$	46,807	6.356	2.007	3.074	4.954	6.353	7.700	9.752
$MB_{i,t}$	46,807	1.927	1.712	0.538	0.906	1.365	2.256	5.400
$RD_{i,t}$	46,807	0.435	1.722	0.000	0.000	0.008	0.111	1.894
$CAPEX_{i,t}$	46,807	0.046	0.056	0.003	0.014	0.028	0.056	0.151
$DIV_{i,t}$	46,807	0.399	0.490	0.000	0.000	0.000	1.000	1.000
$EBIT_{i,t}$	46,807	0.001	0.240	-0.480	-0.019	0.062	0.115	0.224
$LEV_{i,t}$	46,807	0.222	0.219	0.000	0.016	0.179	0.346	0.644
$RISK_{i,t}$	46,807	4.125	5.601	0.090	0.701	2.092	4.752	17.222
$ACQ_{i,t}$	46,807	0.026	0.062	0.000	0.000	0.000	0.016	0.166
$SPRD_{i,t}$	46,807	0.011	0.005	0.007	0.008	0.010	0.012	0.017
$NDI_{i,t}$	46,807	0.012	0.094	-0.101	-0.015	0.000	0.016	0.194
$IPO5_{i,t}$	46,807	0.138	0.345	0.000	0.000	0.000	0.000	1.000
$STD_{i,t}$	46,807	0.030	0.065	0.000	0.000	0.006	0.030	0.141
$STDSQ_{i,t}$	46,807	0.005	0.024	0.000	0.000	0.000	0.001	0.020
$BLOCK_{i,t}$	46,807	0.217	0.175	0.000	0.074	0.202	0.326	0.511
$ANAL_{i,t}$	46,807	2.396	1.732	0.000	0.000	2.833	3.784	4.812
$BSIZE_{i,t}$	46,807	8.111	2.206	5.000	7.000	8.000	9.000	12.000
$INDDR_{i,t}$	46,807	0.650	0.145	0.400	0.571	0.667	0.750	0.833
$DUAL_{i,t}$	46,807	0.397	0.489	0.000	0.000	0.000	1.000	1.000

Panel C. RDD sample

Variable	Obs.	Mean	S.D.	P5	P25	Median	P75	P95
Dependent variable								
$CASH_{i,t}$	16,247	0.198	0.223	0.004	0.027	0.104	0.300	0.691
Institutional ownership variables								
$IO_{i,t}^{Total}$	16,247	0.562	0.258	0.132	0.372	0.581	0.752	0.941
$IO_{i,t}^{Ded}$	16,247	0.029	0.057	0.000	0.000	0.004	0.036	0.131
$IO_{i,t}^{Qix}$	16,247	0.391	0.189	0.082	0.248	0.394	0.528	0.694
$IO_{i,t}^{Trans}$	16,247	0.135	0.114	0.005	0.051	0.111	0.193	0.344
Control variables								
$NWC_{i,t}$	16,247	0.093	0.161	-0.141	-0.014	0.079	0.193	0.381
$SIZE_{i,t}$	16,247	6.565	1.607	4.189	5.444	6.400	7.583	9.483
$MB_{i,t}$	16,247	2.074	1.730	0.643	1.011	1.508	2.457	5.588
$RD_{i,t}$	16,247	0.239	1.160	0.000	0.000	0.006	0.083	0.624
$CAPEX_{i,t}$	16,247	0.065	0.061	0.009	0.026	0.047	0.083	0.189
$DIV_{i,t}$	16,247	0.471	0.499	0.000	0.000	0.000	1.000	1.000
$EBIT_{i,t}$	16,247	0.072	0.161	-0.213	0.042	0.094	0.148	0.257
$LEV_{i,t}$	16,247	0.192	0.190	0.000	0.016	0.158	0.306	0.550
$RISK_{i,t}$	16,247	1.154	2.451	0.068	0.223	0.523	1.450	3.166
$ACQ_{i,t}$	16,247	0.027	0.061	0.000	0.000	0.000	0.022	0.160
$SPRD_{i,t}$	16,247	0.009	0.002	0.006	0.007	0.008	0.010	0.013
$NDI_{i,t}$	16,247	0.011	0.085	-0.090	-0.014	0.000	0.015	0.168
$IPO5_{i,t}$	16,247	0.205	0.404	0.000	0.000	0.000	0.000	1.000
$STD_{i,t}$	16,247	0.029	0.055	0.000	0.000	0.007	0.034	0.127
$STDSQ_{i,t}$	16,247	0.004	0.017	0.000	0.000	0.000	0.001	0.016
$BLOCK_{i,t}$	16,247	0.157	0.143	0.000	0.056	0.133	0.234	0.409
$ANAL_{i,t}$	16,247	2.425	1.591	0.000	1.099	2.833	3.638	4.615

Note: This table presents the summary statistics for the variables used in the regression analyses and RDD analyses. Panel A reports the summary statistics for all the variables used in our regression models in Panel A of Table 5 over the 1981–2021 sample period. Panel B reports the summary statistics for all the variables used in our regression models in Panel B of Table 5 over the 1999–2021 sample period. Panel C reports the summary statistics for firms that belong to Russell 1000/2000 indices from 1990 to 2006. The definitions of all variables are provided in Appendix B. S.D. stands for sample standard deviation; P5 is the 5th percentile value; P25 is the 25th percentile value; Median is the sample median value; P75 is the 75th percentile value; P95 is the 95th percentile value.

TABLE 2 Mean cash holdings and institutional ownership by industry and firm size category

Panel A. Mean cash holdings and institutional ownership by industry

Industry	No. of obs.	No. of firms	$CASH_{i,t}$	$IO_{i,t}^{Total}$	$IO_{i,t}^{Ded}$	$IO_{i,t}^{Qix}$	$IO_{i,t}^{Trans}$
Agriculture	589	70	0.171	0.337	0.030	0.228	0.063
Food Products	2,923	267	0.099	0.377	0.022	0.261	0.082
Candy and Soda	409	40	0.105	0.383	0.021	0.261	0.088
Alcoholic Beverages	626	59	0.118	0.440	0.028	0.320	0.080
Tobacco Products	165	18	0.105	0.553	0.029	0.408	0.091
Recreational Products	1,371	156	0.148	0.297	0.011	0.203	0.071
Entertainment	2,355	317	0.139	0.349	0.027	0.209	0.095
Printing and Publishing	1,260	126	0.121	0.515	0.036	0.390	0.074
Consumer Goods	2,920	294	0.120	0.396	0.022	0.286	0.074
Apparel	2,309	208	0.133	0.433	0.020	0.298	0.104
Healthcare	3,185	406	0.157	0.398	0.020	0.249	0.112
Medical Equipment	5,936	652	0.296	0.372	0.015	0.244	0.099
Pharmaceutical Products	10,966	1,392	0.518	0.404	0.031	0.240	0.112
Chemicals	3,358	275	0.120	0.477	0.023	0.338	0.102
Rubber and Plastic Products	1,508	169	0.100	0.317	0.025	0.223	0.061
Textiles	993	107	0.062	0.352	0.025	0.258	0.060
Construction Materials	3,616	318	0.106	0.415	0.032	0.289	0.077
Construction	1,349	156	0.121	0.410	0.019	0.276	0.096
Steel Works, Etc.	2,526	218	0.081	0.449	0.023	0.316	0.097
Fabricated Products	665	61	0.115	0.295	0.022	0.208	0.057
Machinery	5,833	501	0.136	0.429	0.022	0.307	0.087
Electrical Equipment	2,575	226	0.158	0.370	0.028	0.262	0.069
Automobiles and Trucks	2,570	243	0.112	1.615	1.181	0.321	0.096
Aircraft	953	65	0.091	0.483	0.039	0.330	0.098
Shipbuilding, Railroad Eq.	312	36	0.151	0.445	0.046	0.282	0.101
Defense	302	24	0.233	0.474	0.028	0.310	0.118
Precious Metals	1,208	135	0.140	0.337	0.007	0.236	0.078
Nonmetallic Mining	804	85	0.116	0.477	0.017	0.348	0.091
Coal	377	44	0.087	0.472	0.023	0.293	0.124
Petroleum and Natural Gas	8,044	935	0.096	0.417	0.020	0.271	0.106
Telecommunications	5,224	636	0.139	0.459	0.034	0.282	0.124
Personal Services	1,905	218	0.197	0.533	0.033	0.328	0.123
Business Services	20,126	2,742	0.292	0.423	0.021	0.265	0.113
Computers	6,612	798	0.273	0.356	0.017	0.234	0.094
Electronic Equipment	10,656	930	0.250	0.399	0.015	0.264	0.107
Measuring and Control Eq.	3,710	327	0.221	0.386	0.014	0.275	0.086
Business Supplies	2,186	180	0.083	0.453	0.028	0.325	0.088
Shipping Containers	535	48	0.049	0.535	0.039	0.361	0.118
Transportation	5,085	507	0.110	0.464	0.021	0.305	0.119
Wholesale	6,278	662	0.094	0.373	0.018	0.260	0.082
Retail	8,983	941	0.116	0.464	0.024	0.308	0.118
Restaurants, Hotel, Motel	3,199	364	0.098	0.416	0.021	0.269	0.108
Miscellaneous	2,002	259	0.203	0.283	0.023	0.180	0.069
Total	148,508	16,215	0.198	0.433	0.042	0.273	0.101

Panel B. Mean cash holdings and institutional ownership by categories of firm size

Firm size	No. of obs.	No. of firms	$CASH_{i,t}$	$IO_{i,t}^{Total}$	$IO_{i,t}^{Ded}$	$IO_{i,t}^{Qix}$	$IO_{i,t}^{Trans}$
Small	49,453	8,995	0.261	0.143	0.011	0.091	0.036
Medium-sized	49,602	8,410	0.213	0.431	0.025	0.278	0.110
Large	49,453	5,104	0.120	0.724	0.092	0.451	0.155
Total	148,508	16,215	0.198	0.433	0.042	0.273	0.101

Note: This table presents the number of firm-year observations and the number of unique firms and the sample means of cash holdings ($CASH_{i,t}$) and institutional ownership measures ($IO_{i,t}^{Total}$, $IO_{i,t}^{Ded}$, $IO_{i,t}^{Qix}$, and $IO_{i,t}^{Trans}$) by industry (Panel A) and firm size category (Panel B). These measures are defined in Appendix B. In Panel A, while we construct subsamples using the 48-industry classification used by Fama and French (1997), we follow conventional practice by excluding any firms that belong to either utilities, banking, insurance, real estate, or trading industries. In Panel B, firms are grouped into three subsamples based on terciles of inflation-adjusted total assets ($SIZE_{i,t}$). All variables used in this table are available for the 1981–2021 sample period.

TABLE 3 Sample correlation matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
(1) $CASH_{i,t}$	1.00																					
(2) $IO_{i,t}^{Trans}$	0.06	1.00																				
(3) $NWC_{i,t}$	-0.27	-0.07	1.00																			
(4) $SIZE_{i,t}$	-0.26	0.25	-0.08	1.00																		
(5) $MB_{i,t}$	0.38	0.07	-0.15	-0.17	1.00																	
(6) $RD_{i,t}$	0.44	-0.01	-0.19	-0.16	0.21	1.00																
(7) $CAPEX_{i,t}$	-0.19	-0.02	-0.12	0.01	0.01	-0.08	1.00															
(8) $DIV_{i,t}$	-0.24	-0.01	0.06	0.37	-0.12	-0.12	0.03	1.00														
(9) $EBIT_{i,t}$	-0.35	0.09	0.35	0.39	-0.19	-0.48	0.04	0.22	1.00													
(10) $LEV_{i,t}$	-0.40	-0.01	-0.20	0.21	-0.14	-0.10	0.09	0.07	0.00	1.00												
(11) $RISK_{i,t}$	0.25	0.10	-0.17	0.07	0.12	0.27	-0.14	-0.08	-0.18	-0.02	1.00											
(12) $ACQ_{i,t}$	-0.13	0.06	-0.02	0.11	-0.03	-0.06	-0.09	0.02	0.08	0.11	0.00	1.00										
(13) $SPRD_{i,t}$	-0.04	-0.02	0.03	0.02	-0.11	-0.03	0.06	0.06	0.03	0.02	-0.05	-0.02	1.00									
(14) $NDI_{i,t}$	-0.01	0.01	-0.03	0.06	0.04	0.02	0.16	0.01	-0.05	0.23	0.02	0.32	0.01	1.00								
(15) $IPO5_{i,t}$	0.22	0.03	-0.09	-0.13	0.15	0.10	0.04	-0.19	-0.14	-0.06	0.00	0.05	-0.14	0.01	1.00							
(16) $STD_{i,t}$	-0.21	-0.11	-0.28	-0.14	-0.07	-0.04	-0.01	-0.05	-0.14	0.42	-0.07	-0.02	0.01	-0.02	-0.03	1.00						
(17) $STDSQ_{i,t}$	-0.12	-0.08	-0.31	-0.14	-0.02	-0.01	-0.02	-0.07	-0.16	0.36	-0.04	-0.03	0.01	-0.02	-0.01	0.92	1.00					
(18) $BLOCK_{i,t}$	0.01	0.55	-0.05	0.27	-0.02	-0.01	-0.05	0.03	0.08	0.03	0.12	0.03	-0.02	0.01	0.01	-0.08	-0.07	1.00				
(19) $ANAL_{i,t}$	0.00	0.25	-0.04	0.50	0.08	-0.04	-0.02	0.10	0.19	-0.01	0.15	0.07	-0.05	0.04	-0.01	-0.17	-0.13	0.20	1.00			
(20) $BSIZE_{i,t}$	-0.23	0.12	-0.04	0.61	-0.07	-0.09	0.01	0.29	0.21	0.19	-0.05	0.03	-0.01	0.01	-0.09	-0.03	-0.06	0.10	0.34	1.00		
(21) $INDDR_{i,t}$	0.01	0.16	-0.02	0.16	0.01	0.01	-0.05	0.05	0.03	0.01	0.06	0.02	0.01	0.02	-0.10	-0.04	-0.05	0.13	0.18	0.18	1.00	
(22) $DUAL_{i,t}$	-0.11	0.01	0.05	0.10	-0.02	-0.08	0.04	0.08	0.11	0.02	-0.12	0.02	0.03	0.00	-0.03	0.02	0.01	-0.05	0.04	0.03	0.14	1.00

Note: This table presents pairwise Pearson correlation coefficients between all the independent variables included in our regression model. All proxies except board characteristics (i.e., $BSIZE_{i,t}$, $INDDR_{i,t}$, and $DUAL_{i,t}$) are available for the 1981–2021 sample period, while board characteristics are available only for the 1999–2021 sample period. The definitions of variables are provided in Appendix B.

TABLE 4 Univariate comparisons of cash holdings across institutional ownership types

Panel A. Univariate comparisons by total IO

Variables	High $IO_{i,t}^{Total}$	Low $IO_{i,t}^{Total}$	Diff. (High−Low)	t-stat/z-stat
Mean cash ratio	0.191	0.205	-0.014	-12.08***
Median cash ratio	0.104	0.107	-0.003	-3.30***

Panel B. Univariate comparisons by dedicated IO

Variables	High $IO_{i,t}^{Ded}$	Low $IO_{i,t}^{Ded}$	Diff. (High−Low)	t-stat/z-stat
Mean cash ratio	0.191	0.204	-0.013	-11.41***
Median cash ratio	0.098	0.114	-0.016	-13.04***

Panel C. Univariate comparisons by quasi-indexer IO

Variables	High $IO_{i,t}^{Qix}$	Low $IO_{i,t}^{Qix}$	Diff. (High−Low)	t-stat/z-stat
Mean cash ratio	0.179	0.217	-0.039	-32.99***
Median cash ratio	0.097	0.116	-0.019	-22.05***

Panel D. Univariate comparisons by transient IO

Variables	High $IO_{i,t}^{Trans}$	Low $IO_{i,t}^{Trans}$	Diff. (High−Low)	t-stat/z-stat
Mean cash ratio	0.214	0.182	0.032	27.13***
Median cash ratio	0.123	0.090	0.033	34.06***

Note: This table presents the differences in means and medians of the cash ratio ($CASH_{i,t}$) between firms with High (i.e., above-median) institutional ownership (IO) and those with low (i.e., below-median) IO based on total IO (Panel A) and three alternative types of IOs (Panels B to D) with parametric Student's t-test and nonparametric Wilcoxon's rank sum (Mann-Whitney) test results. The sample period is from 1981 to 2021. We follow Bushee (1998) and Bushee (2001) to classify institutions into transient, quasi-indexer, and dedicated institutions. Transient institutions are defined as institutions with high portfolio turnover and diversified portfolio holdings, quasi-indexer institutions are those with low turnover and diversified portfolios, and dedicated institutions have low turnover and more concentrated portfolio holdings. Combining Brian Bushee's classification data available through his website with the Thompson Reuters' 13F data, we obtain each firm's holdings by the three different types of institutions as percentages of the number of shares outstanding. A more detailed description of the institutional ownership measures is provided in Appendix A. The last column in each panel report t-statistics for Student's t-tests and z-statistics for Wilcoxon's rank sum (Mann-Whitney) tests. Superscripts *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

TABLE 5 The effect of institutional ownership types on corporate cash holdings—Main analysis

Panel A. With blockholding and analyst coverage as governance controls

Model	(1)	(2)	(3)	(4)	(5)
$IO_{i,t}^{Total}$	-0.000				
	(0.000)				
$IO_{i,t}^{Ded}$		-0.000***			-0.000***
		(0.000)			(0.000)
$IO_{i,t}^{Qix}$			-0.002***		-0.001*
			(0.001)		(0.001)
$IO_{i,t}^{Trans}$				0.022***	0.022***
				(0.008)	(0.008)
$NWC_{i,t}$	-0.364***	-0.364***	-0.364***	-0.363***	-0.363***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
$SIZE_{i,t}$	-0.011***	-0.011***	-0.011***	-0.012***	-0.012***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
$MB_{i,t}$	0.011***	0.011***	0.011***	0.011***	0.011***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
$RD_{i,t}$	0.015***	0.015***	0.015***	0.015***	0.015***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
$CAPEX_{i,t}$	-0.404***	-0.404***	-0.404***	-0.405***	-0.405***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
$DIV_{i,t}$	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
$EBIT_{i,t}$	0.096***	0.096***	0.096***	0.095***	0.095***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
$LEV_{i,t}$	-0.183***	-0.183***	-0.184***	-0.183***	-0.183***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
$RISK_{i,t}$	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$ACQ_{i,t}$	-0.330***	-0.330***	-0.330***	-0.332***	-0.331***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
$SPRD_{i,t}$	0.072	0.072	0.071	0.080	0.079
	(0.165)	(0.165)	(0.165)	(0.165)	(0.165)
$NDI_{i,t}$	0.154***	0.154***	0.154***	0.154***	0.154***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
$IPO5_{i,t}$	0.037***	0.037***	0.037***	0.037***	0.037***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
$STD_{i,t}$	-0.761***	-0.761***	-0.761***	-0.760***	-0.760***
	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)
$STDSQ_{i,t}$	0.817***	0.817***	0.818***	0.814***	0.815***
	(0.036)	(0.036)	(0.036)	(0.036)	(0.036)
$BLOCK_{i,t}$	0.006**	0.006**	0.008***	-0.001	-0.000
	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)
$ANAL_{i,t}$	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Firm FE	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
Observations	148,508	148,508	148,508	148,508	148,508
R-squared	0.242	0.242	0.242	0.243	0.243
Number of firms	16,215	16,215	16,215	16,215	16,215

Panel B. With board characteristics as additional governance controls

Model	(1)	(2)	(3)	(4)	(5)
$IO_{i,t}^{Total}$	0.039***				
	(0.007)				
$IO_{i,t}^{Ded}$		-0.028*			-0.006
		(0.014)			(0.015)
$IO_{i,t}^{Qix}$			0.011		0.010
			(0.007)		(0.007)
$IO_{i,t}^{Trans}$				0.074***	0.073***
				(0.010)	(0.010)
$BSIZE_{i,t}$	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
$INDDR_{i,t}$	0.027***	0.029***	0.029***	0.028***	0.027***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
$DUAL_{i,t}$	-0.003	-0.003	-0.003	-0.002	-0.003
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Controls in Table 5 Panel A	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
Observations	46,807	46,807	46,807	46,807	46,807
Number of firms	5,169	5,169	5,169	5,169	5,169
R-squared	0.211	0.209	0.209	0.211	0.212

Note: This table presents the estimation results for the following fixed effects regression model in which the dependent variable is the cash ratio ($CASH_{i,t}$):

$$CASH_{i,t} = \alpha + \beta IO\_Type_{i,t} + \gamma' \mathbf{X}_{i,t} + FIRM_i + YR_t + \varepsilon_{i,t},$$

where $IO\_Type_{i,t}$ is firm i's institutional ownership (IO) of a specific type, i.e., total IO, dedicated IO, quasi-indexer IO, or transient IO, in year t and $\mathbf{X}_{i,t}$ is a vector containing all control variables that could affect firm i's cash holding decisions in fiscal year t. The definitions of the control variables are provided in Appendix B. Panel A reports the estimation results for the subsample with blockholding and analyst coverage as governance controls (i.e., 1981–2021), while Panel B reports the estimation results with board characteristics as additional controls (i.e., 1999–2021). Standard errors clustered by firm are reported in parentheses. Superscripts *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

TABLE 6 The effect of transient IO on corporate cash holdings—RDD analysis

Bandwidth	[−250,+250]		[−500,+500]		[−750,+750]	
	First stage	Second stage	First stage	Second stage	First stage	Second stage
Model	(1)	(2)	(3)	(4)	(5)	(6)
$Russell2000_{i,t}$	0.037***		0.027***		0.013***	
	(0.009)		(0.006)		(0.005)	
$\widehat{IO_{i,t}^{Trans}}$		0.889***		0.965***		1.683**
		(0.333)		(0.332)		(0.757)
$Rank_{i,t}$	-0.000	-0.000	-0.000	-0.000**	0.000***	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$Russell2000_{i,t} \times Rank_{i,t}$	-0.000	0.000	-0.000	0.000*	-0.000**	0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$FloatAdj_{i,t}$	0.000***	-0.000***	0.000***	-0.000***	0.000***	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Controls in Table 5 Panel A	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Observations	2,694	2,694	5,355	5,355	8,152	8,152
R-squared		0.537		0.530		0.104

Note: This table presents the estimation results for 2SLS regressions stated in equations (2) and (3) using three alternative bandwidths around the Russell 1000/2000 threshold. In the first stage, we estimate transient institutional ownership as a function of the Russell 2000 indicator, and in the second stage, we test the impact of the instrumented transient institutional ownership on cash holdings. The dependent variable is the cash-to-total assets ratio ($CASH_{i,t}$). $Russell2000_{i,t}$ is an indicator variable that equals one if a firm is included in the Russell 2000 index. $Rank_{i,t}$ is the ranking implied by the firm's market capitalization within the assigned index as of May 31st. $FloatAdj_{i,t}$ is the float adjustment calculated as the difference between the rank implied by the May 31st market capitalization and the actual rank assigned by Russell in June. All other independent variables are defined in Appendix B. All regression models include industry and year fixed effects. The sample period is 1990 to 2006. Firm-clustered standard errors are reported in parentheses. Superscripts *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

TABLE 7 The effect of institutional ownership types on corporate cash holdings—Sub-sample analyses

Panel A. Pre versus post global financial crisis (GFC)

	Pre-GFC period		Post-GFC period	
Model	(1)	(2)	(3)	(4)
$IO_{i,t}^{Trans}$	0.128***	0.138***	0.057***	0.053***
	(0.021)	(0.022)	(0.019)	(0.019)
$IO_{i,t}^{Ded}$		0.037		0.006
		(0.041)		(0.029)
$IO_{i,t}^{Qix}$		0.051***		0.014
		(0.018)		(0.011)
Controls in Table 5 Panel A	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Observations	7,520	7,520	7,520	7,520
Number of firms	1,504	1,504	1,504	1,504
R-squared	0.217	0.218	0.243	0.243

Panel B. Positive versus negative transient IO change subsample

	Positive $\Delta IO_{i,t}^{Trans}$		Negative $\Delta IO_{i,t}^{Trans}$	
Model	(1)	(2)	(3)	(4)
$IO_{i,t}^{Trans}$	0.039***	0.039***	0.052***	0.054***
	(0.010)	(0.010)	(0.017)	(0.017)
$IO_{i,t}^{Ded}$		-0.000***		0.036**
		(0.000)		(0.014)
$IO_{i,t}^{Qix}$		0.001		0.011*
		(0.001)		(0.006)
Controls in Table 5 Panel A	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Observations	69,931	69,931	56,885	56,885
Number of firms	12,849	12,849	11,923	11,923
R-squared	0.241	0.241	0.226	0.226

Note: This table presents the subsample estimation results for the following fixed effects regression model in which the dependent variable is the cash ratio ($CASH_{i,t}$):

$$CASH_{i,t} = \alpha + \beta IO_{i,t}^{Trans} + \gamma' \mathbf{X}_{i,t} + FIRM_i + YR_t + \varepsilon_{i,t},$$

where $IO_{i,t}^{Trans}$ is firm i's transient IO in year t and $\mathbf{X}_{i,t}$ is a vector containing all control variables that could affect firm i's cash holding decisions in fiscal year t. The definitions of the control variables are provided in Appendix B. The subsamples are constructed based on pre-GFC (i.e., 2003–2007) versus post-GFC (i.e., 2008–2012) in Panel A and non-negative (i.e., positive or zero) versus negative changes in transient institutional ownership (i.e., $\Delta IO_{i,t}^{Trans} \geq 0$ versus $\Delta IO_{i,t}^{Trans} < 0$) in Panel B. Standard errors clustered by firm are reported in parentheses. Superscripts *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

TABLE 8 The effect of institutional ownership types on the marginal value of cash holdings

Panel A. Return regressions

Model	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta Cash_{i,t}$	2.188***	2.148***	2.224***	2.190***	1.903***	1.965***
	(0.245)	(0.246)	(0.246)	(0.245)	(0.236)	(0.232)
High $IO_{i,t}^{Total} \times \Delta Cash_{i,t}$		0.511**				
		(0.207)				
High $IO_{i,t}^{Total}$		0.157***				
		(0.010)				
High $IO_{i,t}^{Ded} \times \Delta Cash_{i,t}$			-0.133			-0.209
			(0.161)			(0.164)
High $IO_{i,t}^{Ded}$			0.019**			-0.000
			(0.008)			(0.008)
High $IO_{i,t}^{Qix} \times \Delta Cash_{i,t}$				0.222		0.106
				(0.180)		(0.179)
High $IO_{i,t}^{Qix}$				0.070***		0.026**
				(0.010)		(0.011)
High $IO_{i,t}^{Trans} \times \Delta Cash_{i,t}$					0.768***	0.771***
					(0.157)	(0.159)
High $IO_{i,t}^{Trans}$					0.206***	0.202***
					(0.008)	(0.008)
$Cash_{i,t-1} \times \Delta Cash_{i,t}$	-0.127	-0.088	-0.133	-0.104	-0.091	-0.090
	(0.371)	(0.372)	(0.368)	(0.377)	(0.371)	(0.373)
$Cash_{i,t-1}$	0.802***	0.802***	0.803***	0.811***	0.772***	0.776***
	(0.094)	(0.094)	(0.094)	(0.095)	(0.093)	(0.094)
$L_{i,t} \times \Delta Cash_{i,t}$	-3.037***	-2.897***	-3.043***	-3.014***	-2.755***	-2.759***
	(0.323)	(0.330)	(0.327)	(0.325)	(0.321)	(0.323)
$L_{i,t}$	-0.605***	-0.582***	-0.604***	-0.596***	-0.576***	-0.573***
	(0.025)	(0.025)	(0.026)	(0.025)	(0.025)	(0.025)
$BLOCK_{i,t} \times \Delta Cash_{i,t}$	-0.685	-1.400***	-0.627	-0.960**	-1.156**	-1.205**
	(0.450)	(0.541)	(0.458)	(0.489)	(0.485)	(0.517)
$BLOCK_{i,t}$	-0.095***	-0.287***	-0.101***	-0.169***	-0.196***	-0.221***
	(0.023)	(0.026)	(0.023)	(0.025)	(0.023)	(0.025)
$ANAL_{i,t} \times \Delta Cash_{i,t}$	0.189***	0.101	0.201***	0.150**	0.072	0.072
	(0.069)	(0.078)	(0.072)	(0.072)	(0.077)	(0.079)
$ANAL_{i,t}$	-0.001	-0.026***	-0.003	-0.012***	-0.029***	-0.032***
	(0.003)	(0.004)	(0.004)	(0.003)	(0.004)	(0.004)
Controls in Faulkender and Wang (2006)	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Observations	58,466	58,466	58,466	58,466	58,466	58,466
Adjusted R-squared	0.239	0.243	0.239	0.240	0.249	0.249

Panel B. Marginal value of cash holdings: High total/transient IO *vs.* low total/transient IO

Model	(1)	(2)	(5)
Sample means for cash value computation			
High $IO_{i,t}^{Total}$		0.721	
High $IO_{i,t}^{Trans}$			0.682
$Cash_{i,t-1}$	0.153	0.153	0.153
$L_{i,t}$	0.211	0.211	0.211
$BLOCK_{i,t}$	0.187	0.187	0.187
$ANAL_{i,t}$	3.011	3.011	3.011
Marginal value of \$1 (Average firm)	\$1.97		
Marginal value of \$1 (High $IO_{i,t}^{Total}$)		\$2.08	
Marginal value of \$1 (Low $IO_{i,t}^{Total}$)		\$1.56	
Difference in marginal value of \$1 (High $IO_{i,t}^{Total}$ − Low $IO_{i,t}^{Total}$)		\$0.52	
Marginal value of \$1 (High $IO_{i,t}^{Trans}$)			\$2.07
Marginal value of \$1 (Low $IO_{i,t}^{Trans}$)			\$1.31
Difference in marginal value of \$1 (High $IO_{i,t}^{Trans}$ − Low $IO_{i,t}^{Trans}$)			\$0.76

Note: This table presents the estimation results of the analysis designed to examine whether different types of institutional ownership have different impacts on the market value of cash holdings. Panel A presents the results for the following regression model which extends the model pioneered by Faulkender and Wang (2006):

$$
\begin{aligned}
r_{i,t} - R^B_{i,t} \quad = \quad & (\beta_0 + \beta_1 High\_IO_{i,t} + \beta_2 Cash_{i,t-1} + \beta_3 L_{i,t} + \beta_4 BLOCK_{i,t} + \beta_5 ANAL_{i,t}) \times \Delta Cash_{i,t} \\
& + \gamma_1 High\_IO_{i,t} + \gamma_2 Cash_{i,t-1} + \gamma_3 L_{i,t} + \gamma_4 BLOCK_{i,t} + \gamma_5 ANAL_{i,t} \\
& + \eta' \mathbf{X}_{i,t} + IND_j + YR_t + \varepsilon_{i,t},
\end{aligned}
$$

where $r_{i,t} - R^B_{i,t}$ is excess annualized stock returns for firm i in fiscal year t, where $R^B_{i,t}$ is the three-month Treasury bill rate ($R^{rf3m}_{i,t}$) measured in the last month of firm i's fiscal year t; $High\_IO_{i,t}$ is a dummy variable which equals 1 if the institutional ownership of a specific type, i.e., total IO, dedicated IO, quasi-indexer IO, or transient IO is high (i.e., above-median) and 0 otherwise; $Cash_{i,t-1}$ is lagged cash holdings scaled by lagged market capitalization; $L_{i,t}$ is defined as the market debt ratio, calculated as total debt over the sum of total debt and the market value of equity; $BLOCK_{i,t}$ and $ANAL_{i,t}$ are blockholding and analyst coverage, respectively, as defined in Appendix B; $\Delta Cash_{i,t}$ is the change in cash during year t scaled by lagged market capitalization; and $\mathbf{X}_{i,t}$ is a vector containing all control variables used in Faulkender and Wang (2006). The sample period is 1981 to 2021. Standard errors clustered by firm are reported in parentheses. Superscripts *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively. Panel B reports the marginal values of an extra dollar of cash for firms with high total/transient IO and firms with low total/transient IO. The marginal value of an extra dollar of cash is calculated following Dittmar and Mahrt-Smith (2007).

TABLE 9 Financial constraints and the effect of transient institutional ownership on corporate cash holdings

	Financial constraint measure						
Model	Size (1)	Payout (2)	Paper rating (3)	Bond rating (4)	KZ index (5)	WW index (6)	SA index (7)
$IO_{i,t}^{Trans}$	0.011***	0.016***	0.008**	0.015***	0.030***	0.007*	0.026***
	(0.004)	(0.004)	(0.004)	(0.003)	(0.008)	(0.004)	(0.005)
$FC_{i,t}$	0.046***	0.006***	-0.028***	-0.028***	-0.150***	0.002	0.039***
	(0.005)	(0.002)	(0.001)	(0.001)	(0.003)	(0.002)	(0.003)
$FC_{i,t} \times IO_{i,t}^{Trans}$	0.092***	0.010**	0.019***	0.009***	0.046***	0.024***	0.054***
	(0.010)	(0.005)	(0.004)	(0.003)	(0.008)	(0.006)	(0.009)
Controls in Table 5 Panel A	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y
Observations	95,300	145,077	148,508	148,508	33,646	88,741	95,889
Number of firms	13,105	16,079	16,215	16,215	5,381	13,013	13,327
Adjusted R-squared	0.099	0.148	0.155	0.156	0.130	0.077	0.112

Note: This table presents the estimation results for the fixed effects regressions designed to investigate the impact of transient institutional ownership ($IO_{i,t}^{Trans}$), a financial constraints dummy ($FC_{i,t}$), and their interaction term ($IO_{i,t}^{Trans} \times FC_{i,t}$) on cash-to-total assets ratio ($CASH_{i,t}$). Seven financial constraint measures are used. The first two measures are based on 'size' measured as the book value of total assets and 'payout ratio' measured as the ratio of dividends and common stock repurchases to operating income. We rank firms based on their sizes and payout ratios and classify firms in the bottom tercile as being financially constrained. The third and fourth measures are based on 'paper rating' and 'bond rating'. We classify firms that do not have Standard & Poor's short- or long-term debt rating or belong to a default category as financially constrained. The last three measures are based on the 'KZ index' from Kaplan and Zingales (1997), 'WW index' from Whited and Wu (2006), and 'SA index' from Hadlock and Pierce (2010). We classify firms with an index in the upper tercile as financially constrained. The definitions of all other independent variables are provided in Appendix B. All regression models include industry and year fixed effects. The sample period is 1981 to 2021. Robust standard errors are reported in parentheses. Superscripts *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

TABLE 10 Further financial effects of transient IO

Panel A. Effect of transient IO on the costs of debt and equity capital

Dependent variable	$COD_{i,t}$	$COE_{i,t}$
Model	(1)	(2)
$IO_{i,t}^{Trans}$	0.237***	-5.717***
	(0.079)	(0.931)
Controls in Table 5 Panel A	Y	Y
Board characteristics	Y	Y
Firm FE	Y	Y
Year FE	Y	Y
Observations	45,243	29,858
Number of firms	4,800	3,651
R-squared	0.044	0.095

Panel B. Effect of transient IO on debtholder–shareholder conflicts

Dependent variable	$NCOV_{i,t}$
Model	(1)
$IO_{i,t}^{Trans}$	0.244***
	(0.094)
Controls in Table 5 Panel A	Y
Board characteristics	Y
Firm FE	Y
Year FE	Y
Observations	19,850
Number of firms	2,386
R-squared	0.219

Panel C. Effect of transient IO on stock price crash risk

Dependent variable	$NCSKEW_{i,t}$	$DUVOL_{i,t}$	$EXTRASIG_{i,t}$	$COUNT_{i,t}$
Model	(1)	(2)	(3)	(4)
$IO_{i,t}^{Trans}$	-1.397***	-0.207***	-0.472***	-0.410***
	(0.082)	(0.021)	(0.060)	(0.050)
Controls in Table 5 Panel A	Y	Y	Y	Y
Board characteristics	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Observations	46,529	46,494	46,574	46,623
Number of firms	5,011	5,010	5,011	5,013
R-squared	0.081	0.046	0.043	0.020

Note: This table presents the estimation results for the fixed effects regressions designed to examine how transient IO influences 1) the costs of debt and equity capital, 2) debtholder–shareholder conflicts, and 3) stock price crash risk. In Panel A, the dependent variables are the cost of debt ($COD_{i,t}$) and the cost of equity ($COE_{i,t}$) in Columns (1) and (2), respectively. In Panel B, the dependent variable is the average number of loan covenants ($NCOV_{i,t}$). In Panel C, the dependent variables in Columns (1) through (4) are the following four stock price crash risk measures: $NCSKEW_{i,t}$, which is the negative conditional skewness of firm-specific weekly returns (Column (1)); $DUVOL_{i,t}$, which is down-to-up volatility calculated as the natural logarithm of the ratio of the standard deviation of firm-specific weekly returns in down weeks to that in up weeks (Column (2)); $EXTRASIG_{i,t}$, which is minus one multiplied by the worst deviation between the firm-specific weekly return and the annual mean divided by the standard deviations of the firm-specific weekly return over the year (Column (3)); and $COUNT_{i,t}$, which is the number of crashes minus the number of jumps over the fiscal year (Column (4)), where a crash (jump) occurs when the firm-specific weekly return is 3.09 standard deviations below (above) its mean over the year. The definitions of all independent variables are provided in Appendix B. The sample period is 1999 to 2021. The standard errors clustered by firm are reported in parentheses. Superscripts *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

TABLE 11 Two-stage least squares (2SLS) estimation of cash value regressions

	With transient IO only		With other IO types	
	Stage 1 (1)	Stage 2 (2)	Stage 1 (3)	Stage 2 (4)
$\Delta\widehat{Cash}_{i,t}$		3.331***		3.333***
		(0.209)		(0.202)
$\Delta IO^{Trans}_{i,t}$	0.080***		0.086***	
	(0.010)		(0.010)	
$\Delta IO^{Ded}_{i,t}$			-0.014	
			(0.023)	
$\Delta IO^{Qix}_{i,t}$			0.043***	
			(0.009)	
$\Delta E_{i,t}$	0.014	0.784***	0.014	0.784***
	(0.010)	(0.107)	(0.010)	(0.108)
$\Delta NA_{i,t}$	-0.158***	0.169**	-0.158***	0.169**
	(0.008)	(0.067)	(0.008)	(0.068)
$\Delta RD_{i,t}$	0.265***	-0.844	0.261***	-0.846
	(0.087)	(0.720)	(0.087)	(0.725)
$\Delta I_{i,t}$	-0.105	-2.550***	-0.101	-2.549***
	(0.136)	(0.877)	(0.136)	(0.877)
$\Delta D_{i,t}$	-0.214**	0.023	-0.231**	0.024
	(0.102)	(2.429)	(0.102)	(2.430)
$NF_{i,t}$	0.211***	-0.286***	0.211***	-0.286***
	(0.012)	(0.083)	(0.012)	(0.083)
Δ Controls in Table 5 Panel B	Y	N	Y	N
Industry FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
Observations	23,299	23,299	23,299	23,299
R-squared		0.109		0.109

Note: This table presents the estimation results for 2SLS regressions below:

$$\begin{aligned}\Delta Cash_{i,t} &= a + b\Delta IO\_Type_{i,t} + c'\Delta\mathbf{X_1}_{i,t} + IND_j + YR_t + \xi_{i,t};\\ r_{i,t} - R^B_{i,t} &= \beta\Delta\widehat{Cash}_{i,t} + \eta'\mathbf{X_2}_{i,t} + IND_j + YR_t + \varepsilon_{i,t},\end{aligned}$$

The variables in the first-stage equation are defined as follows: $\Delta Cash_{i,t}$ is measured as the change in firm i's cash holdings in fiscal year t scaled by the market value of equity at the end of fiscal year $t-1$; $IO\_Type_{i,t}$ is firm i's IO of a specific type, i.e., dedicated IO, quasi-indexer IO, or transient IO in year t; and $\Delta\mathbf{X_1}_{i,t}$ is a vector containing the first-differences of all control variables that could affect firm i's cash-holding decisions in year t (i.e., all controls in Table 5 Panel B). The variables in the second-stage equation are defined as follows: $r_{i,t} - R^B_{i,t}$ is the excess annualized stock return for firm i over fiscal year t, computed as firm i's stock return over fiscal year t minus the return on a three-month treasury bill measured in the last month of firm i's fiscal year; The key right-hand side variable is $\Delta\widehat{Cash}_{i,t}$, measured as the fitted value of the change in firm i's cash holdings in fiscal year t scaled by the market value of equity at the end of fiscal year $t-1$; and $\mathbf{X_2}_{i,t}$ is a series of control variables used by Faulkender and Wang (2006) (i.e., the change in earnings before interest expenses and extraordinary items, the change in book assets net of cash and cash equivalents, the change in R&D expenses, the change in interest expenses, the change in dividends, and net financing during the fiscal year. All these variables are scaled by the lagged market value of equity. All of these control variables are the changes in various firm characteristics that may also affect firm value. Additionally, we include industry and year fixed effects in both first-stage and second-stage equations to capture unobserved heterogeneity in excess stock returns across industries and years. The standard errors clustered by firm are reported in parentheses. Superscripts *, **, and *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.