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Corporate Assessments of Cash Sufficiency and Implications for Business Strategies

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Corporate Assessments of Cash Sufficiency and Implications for Business Strategies[1]

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Abstract

We analyze survey data from Japanese firms to explore their self-reported assessments of cash sufficiency at the onset of COVID-19 and their intended cash use thereafter. A striking 71.4% of firms reported their cash holdings as more than sufficient to address the cash flow shortfalls caused by the pandemic. This sufficiency was not necessarily a result of ample cash holdings; rather, low leverage and shorter expectations for revenue recovery were key factors. Firms confident in their cash sufficiency intended to allocate their cash towards pursuing active corporate behavior. In contrast, those with high actual cash holdings exhibited managerial conservatism.

Keywords: Private information, Cash holdings, Leverage, COVID-19
JEL classification: G31, G32

[1] This paper is an outcome of the "Future Issues and Empirical Analysis of Corporate Taxation" project undertaken at the Research Institute of Economy, Trade, and Industry (RIETI). I express my gratitude to the Ministry of Economy, Trade, and Industry (METI) for granting access to survey data, "Survey on Corporate Activities and Tax Liabilities," and to the RIETI for providing the TSR Database. I am grateful to Motohiro Sato, Daiji Kawaguchi, and Yukihiro Yasuda for their valuable comments. I also presented a draft of this paper at the RIETI Discussion Paper Seminar and am grateful to the seminar participants for their helpful comments. I gratefully acknowledge the financial support from the Japan Society for the Promotion of Science (22K13426).

1. Introduction

Firms should base their current cash holdings on their future outlook, considering factors such as investment opportunities. In a frictionless market, firms would optimally choose their cash holdings based purely on expected future needs, making cash levels and perceptions of cash sufficiency independent. However, in reality, financial frictions—such as asymmetric information and financing constraints—can cause firms to hold precautionary cash reserves, leading to potential divergences between observed cash holdings and managerial assessments of sufficiency. While some aspects of these assessments could be disclosed publicly, other details remain private within the firm. However, finance research generally relies only on publicly disclosed data, likely due to data limitations.

We use survey data that reveals private information on cash holdings, in addition to financial data covering both public and private firms in Japan. The government conducted the survey, with finance and accounting representatives as the primary respondents. The survey took place in July 2020, a critical phase of the COVID-19 pandemic. The timing is suitable for our purpose. First, the pandemic, characterized as a negative cash flow shock (Fahlenbrach et al., 2021), likely influenced how firms perceived their existing cash holdings—whether as ample, adequate, or insufficient. We expect weaker perceptions of cash sufficiency as indicative of financial constraints. Second, the intense uncertainty during this period (Altig et al. 2020; Baker et al. 2020) likely widened the disparity between publicly available information and private managerial assessments. As a result, private information, separate from public disclosures, is a particularly important source of information.

The survey includes two key questions. First, it asks the sufficiency of their cash reserves during the initial spread of COVID-19. The responses are categorized into four levels: more than sufficient, barely sufficient, slightly insufficient, and substantially insufficient. Second, it inquires about the intended use of the cash, including capital expenditures, R&D expenses, debt repayment, payouts, and keeping it as savings. The survey also includes questions on whether firms experienced sales declines due to COVID-19 and their expected recovery period.

Combining this survey with financial statements, we address three questions. First, did most firms perceive their cash holdings as insufficient at the onset of COVID-19? Second, what factors, including but not limited to cash levels, shaped these perceptions? Third, did perceptions of cash sufficiency influence firms' cash allocation strategies differently compared to the effects of their actual cash holdings?

In response to our first question, a striking 71.4% of firms indicated that their cash holdings were more than sufficient. Even among firms experiencing sales declines during the pandemic, representing two-thirds of our sample, 63.6% still reported this level of sufficiency. The perception of high cash sufficiency among Japanese firms is not due to higher pre-pandemic

cash holdings; in fact, our data shows an average cash-to-assets ratio of 0.18, below the 0.22 ratio among U.S. public firms during a similar period (Fahlenbrach et al. 2021).

In addressing our second question, we find that cash levels alone did not consistently determine perceptions of cash sufficiency. Specifically, while higher cash levels improved perceptions among firms facing sales declines due to COVID-19, this relationship did not hold for the one-third of firms unaffected by the pandemic. These findings highlight the role of other factors in shaping how firms evaluate their cash positions.

We find two forward-looking factors. Firms with lower leverage reported better perceptions of cash sufficiency. This finding suggests that firms consider future debt obligations as part of their current cash sufficiency assessments. Moreover, firms anticipating a longer recovery period from COVID-19 perceived their cash sufficiency as lower.

For our third question, we find that firms with high cash perception and those with high cash holdings pursued contrasting strategies. In terms of short-term liquidity management, firms with larger cash holdings planned to keep funds as savings, a behavior not observed among firms with higher cash perception. Firms confident in their cash sufficiency were less inclined to allocate cash to working capital. These findings suggest a possibility that firms with high cash perception could channel funds into more active corporate behavior.

We demonstrate that firms confident in their cash sufficiency intended to allocate funds toward investment activities such as capital expenditures, R&D expenses, and M&A activities. In contrast, firms with larger cash holdings adopted a more conservative approach, avoiding similar allocations.

We contribute to the literature in several ways. First, private information regarding cash holdings is particularly valuable for studying financial constraints. In the absence of such information, existing studies often assess whether firms are financially constrained using cash flow sensitivity of investment (Fazzari et al. 1988) or cash flow sensitivity of cash (Almeida et al. 2004). Other studies focus on certain firm-level characteristics, such as firm size or payouts, or employ composite measures of firm attributes, including the Kaplan-Zingales index (Kaplan and Zingales 1997), the Whited-Wu index (Whited and Wu, 2006), or the SA index (Hadlock and Pierce 2010). Despite their widespread use, these measures face ongoing controversies regarding their validity (Farre-Mensa and Ljungqvist, 2016). We suggest that private information on cash holdings has the potential to serve as a valuable alternative for identifying financial constraints.

Second, we demonstrate disparities between observable cash levels and internally assessed cash sufficiency. Prior studies have extensively examined the determinants of cash holdings among public firms (e.g., Opler et al., 1999), including some studies covering private firms (Bigelli and Sánchez-Vidal, 2012; Gao et al., 2013; Mortal et al., 2020), and why cash levels increased (Bates et al., 2009). Our findings suggest that firms' private assessments of cash sufficiency reflect intentions beyond what can be inferred from observable cash levels alone.

In particular, firms with higher cash perception adopted more active corporate policies, whereas those with high cash holdings did not.

Third, we find higher cash holdings reflect managerial conservatism and risk aversion. This finding is in contrast to the established finance literature that argues higher cash levels lead to overinvestment, driven by agency theory (Jensen 1986; Harford 1999) or overconfidence (Malmendier and Tate 2005, 2008). Several studies examine managerial conservatism in various forms, including reputation concerns (Hirshleifer and Thakor 1992), religious affiliations (Baxamusa and Jalal 2016), CEO age (Croci et al. 2017), handwritten signatures (Duong et al. 2021), and mobility (Çolak and Korkeamäki 2021). We contribute to this literature by leveraging survey data on cash use to provide direct evidence of managerial conservatism.

Fourth, several studies employ survey data to capture private information during major crises, such as the 2008 global financial crisis (Campello et al. 2010, 2011) or COVID-19 (Barry et al. 2022). These studies underscore liquidity, whether as cash or credit lines, is important for firms to avoid foregoing investment opportunities during crises. Most relevant to our study, Barry et al. (2022) report that better internal assessments of financial flexibility led to greater investment and employment. Our study differs from Barry et al. (2022) in two key respects. First, we investigate what shaped these perceptions. Second, we compare cash levels with cash perception.

Fifth, we provide new insights into existing evidence that, during the COVID-19 pandemic, high-cash firms experienced smaller stock price declines than low-cash firms (Ramelli and Wagner 2020; Ding et al. 2021; Fahlenbrach et al. 2021). This finding may reflect high-cash firms' capability to absorb expected cash flow shortfalls and reduce costs incurred during financial distress (e.g., Almeida and Philippon 2007). Alternatively, these firms may spend their cash to seize investment opportunities triggered by the pandemic and potential shifts in the economy. Using survey data, we find the latter explanation more compelling.

The remainder of this paper is organized as follows. Section 2 provides background information and describes the data. Section 3 addresses our first question regarding whether firms perceived their cash as sufficient. Section 4 examines the determinants of cash perception. Section 5 examines how cash holdings and cash perception affected firms' intended cash use. Section 6 concludes the paper.

2. Background and Data

2.1. Brief Background

Beginning in December 2019, the COVID-19 pandemic caused a severe exogenous cash flow disruption. It forced firms, particularly small and medium-sized enterprises, into financial distress (Carletti et al. 2020). The crisis underscored the need for effective liquidity

management to address firms' immediate cash flow challenges. Research shows the increasing market value of cash holdings accumulated before the pandemic (Ramelli and Wagner 2020; Ding et al. 2021; Fahlenbrach et al. 2021). US firms draw on credit facilities to strengthen their cash positions (Acharya and Steffen 2020).

While most studies rely on publicly disclosed financial statements, we use survey data to explore firms' internal perceptions of cash sufficiency. We argue that firms with identical cash holdings can perceive their sufficiency differently due to variations in private assessments. This aspect is important because, for instance, precautionary motives suggest that current cash holdings depend on future investment opportunities, some of which likely remain undisclosed and unobservable (Keynes 1936; Opler et al. 1999; Almeida et al. 2004). In particular, crises would widen the gap between these perceptions and public data, increasing the importance of internal perceptions beyond stable conditions.

2.2. Data

We use three datasets: i) a proprietary survey, "Survey on Corporate Activities and Tax Liabilities," from the Ministry of Economy, Trade, and Industry; ii) Nikkei NEEDS FinancialQUEST; and iii) the TSR (Tokyo Shoko Research) Database. FinancialQUEST covers financial statements and stock price data for public firms, comparable to widely used finance datasets such as S&P Compustat. The TSR Database provides data on private firms. This database is frequently used in finance and economic research on Japanese firms, including Carvalho et al. (2021), Hoshi et al. (2023), and Orihara and Suzuki (2023).

The key data is the survey that collects private information regarding cash holdings. Since 2011, the ministry has sent annual questionnaires to firms with paid-in capital exceeding 100 million yen. The 100-million-yen threshold is widely accepted in Japan as a benchmark for classifying larger firms. This threshold is not particularly high and includes nearly all public firms. With 70.2% of our sample consisting of private firms, our data provide broader coverage compared to datasets restricted to public firms.

The July 2020 survey, part of an annual series, is our main data source. The responses were due by August 28. Of the 18,682 target firms, 4,750 responded. The majority of these responses came from finance or accounting professionals within the firms. The 25.4% response rate appears higher than that of most comparable firm-level surveys, including Barry et al. (2022), which achieved a relatively high rate of 19.5%. We merge the survey with financial data from FinancialQUEST and the TSR Database. We evaluate the financial data as of calendar year 2019 to capture pre-determined variations in firm characteristics ahead of the pandemic. Given that a majority of Japanese firms close their fiscal year in March, the financial data largely represent March 2019 figures.

Table 1 presents the summary statistics. After filtering for observations with the necessary data items for our base estimation, the final dataset contains 2,813 firms. Certain variables,

restricted to public firms, have a smaller sample size of 838 observations. For instance, although total debt data covers all firms, detailed components, such as short-term and long-term debts, are only available for public firms. We winsorize continuous variables at the 0.5% and 99.5% levels.

Table 1 shows that the average cash-to-assets ratio, *Cash*, of Japanese firms was not particularly high. The overall average is 0.182, which is lower than the U.S. figure of 0.22 (Fahlenbrach et al. 2021). In line with US GAAP, Japanese accounting standards define "cash" to include both actual cash and cash equivalents, with the latter representing assets maturing within 90 days. Consequently, differences in accounting standards do not affect the comparison between Japan and the U.S.

3. Assessing Cash Sufficiency at the Onset of COVID-19

The *Cash sufficiency score* is the key variable to capture corporate assessments of cash sufficiency. This score ranges from one to four: four for more than sufficient, three for barely sufficient, two for slightly insufficient, and one for substantially insufficient. The *More-than-sufficient cash dummy* is a binary variable that equals one for a score of four and zero for all other scores. The *Sufficient cash dummy* is a binary variable that distinguishes scores of three or four (set to one) from lower scores (set to zero).

Figure 1 depicts the distribution of the *Cash sufficiency score*. Panel A demonstrates that "more than sufficient," the highest score, is disproportionately the most frequent response. Panel B narrows the focus to 1,870 firms, representing 66.5% of the full sample of 2,813, which reported a sales decline due to COVID-19. Even within this pandemic-affected subset, "more than sufficient" stands out as the most frequent response. Table 1 shows that the average *Cash sufficiency score* is 3.50, with 71.4% of firms reporting more-than-sufficient cash, according to the mean of the *More-than-sufficient cash dummy*, and 85.6% reporting sufficient cash or better, based on the mean of the *Sufficient cash dummy*. These observations, addressing the first question, suggest that the majority of firms did not face cash constraints.

In the US, Barry et al. (2022) present comparable findings based on a survey targeting CFOs. Their study employs financial flexibility, a broader measure than cash sufficiency. Barry et al. (2022) asked respondents, "How much financial flexibility would you say your company has?" with response options ranging from 0 (None), 1 (A little), 2-4 (Moderate), to 5 (A lot). In their analysis, financial flexibility is defined as a score of 2 or higher. Barry et al. show that 80.6% of respondents in the US reported that their firms possessed financial flexibility.

Figure 2 presents a box plot illustrating the relationship between the cash sufficiency score and cash holdings, measured as the cash-to-assets ratio. While there is a generally positive relationship between the two variables, substantial variation in cash levels exists even among firms with the same cash sufficiency score. For instance, the bottom 25th percentile cash

holding for firms with the highest cash sufficiency score of 4 is 0.055, which is lower than the median cash holding of 0.071 for those with the lowest score of 1. Additionally, firms with the highest cash sufficiency score have a median cash holding of 0.149, which is lower than the 75th percentile cash holding of 0.151 for those with the lowest score. These observations highlight that cash levels are not necessarily the primary determinants of cash sufficiency.

4. Determinants of Cash Sufficiency Perceptions

4.1. Base Analysis

We examine our second question regarding which pre-pandemic factors shaped perceptions of cash sufficiency during the early stages of the pandemic. Our base model considers two key factors: *Cash*, the cash holdings-to-assets ratio, and *Leverage*, the total liabilities-to-assets ratio. The former captures a firm's current liquidity position and is a natural candidate for affecting perceptions of cash sufficiency. In contrast, *Leverage* reflects future financial obligations and has the potential to shape liquidity assessments. Moreover, leverage becomes particularly important during cash flow shocks, as high levels of debt can increase financial distress risk (Almeida et al., 2012) and influence how firms internally evaluate their liquidity. From these arguments, although the questionnaire does not directly inquire about leverage, finance theory suggests that it could affect firms' liquidity perceptions.

Our estimation uses one of the following as the outcome variable: *Cash sufficiency score*, an ordered categorical variable ranging from 1 to 4; *More-than-sufficient cash dummy*; or *Sufficient cash dummy*. We employ either an ordered probit or a binary probit model, depending on the nature of the outcome variable. Specifically, for the *Cash sufficiency score*, we apply an ordered probit model. This model assumes an underlying latent variable $Cash\ sufficiency\ score_i^*$, defined by $Cash\ sufficiency\ score_i^* = \alpha + \beta_1 Cash_i + \beta_2 Leverage_i + \mu_j + \varepsilon_i$, where μ_j represents industry fixed effects and ε_i is the error term. The observed cash sufficiency score is assigned based on threshold parameters τ_1, τ_2, τ_3 such that:

$$Cash\ sufficiency\ score_i = \begin{cases} 1 & \text{if} \quad Cash\ sufficiency_i^* \le \tau_1 \\ 2 & \text{if } \tau_1 < Cash\ sufficiency_i^* \le \tau_2 \\ 3 & \text{if } \tau_2 < Cash\ sufficiency_i^* \le \tau_3 \\ 4 & \text{if} \quad Cash\ sufficiency_i^* > \tau_3 \end{cases}.$$

This model allows us to estimate the probability that $Cash\ sufficiency\ score_i^*$ falls within each category, using the cumulative normal distribution function. For example, the probability of observing $Cash\ sufficiency\ score_i^* = 1$ is $\Pr(Cash\ sufficiency_i = 1) = \Pr(Cash\ sufficiency_i^* \le \tau_1) = \Phi[\tau_1 - (\alpha + \beta_1 Cash_i + \beta_2 Leverage_i + \mu_j)]$, where $\Phi[z]$ is the cumulative distribution function of the standard normal distribution.

For the binary outcomes, *More-than-sufficient cash dummy* and *Sufficient cash dummy*, we use a probit model. In this framework, the observed binary variable $Cash\ sufficiency_i$ is linked to an underlying continuous latent variable $Cash\ sufficiency_i^{**}$, where $Cash\ sufficiency_i^{**} = \alpha + \beta_1 Cash_i + \beta_2 Leverage_i + \mu_j + \varepsilon_i$. The probability of observing $Cash\ sufficiency_i = 1$ is given by

$$\Pr(Cash\ sufficiency_i = 1) = \Pr(Cash\ sufficiency_i^{**} > 0) = \Phi\big[\alpha + \beta_1 Cash_i + \beta_2 Leverage_i + \mu_j\big]. \quad (1)$$

Table 2 reports the estimation results. Across the three outcome variables, *Cash* has a positive effect, indicating that higher levels of cash holdings are associated with higher cash sufficiency perceptions. *Leverage* shows a negative and statistically significant effect in all specifications, suggesting that higher debt levels reduce perceived cash sufficiency.

Marginal effects indicate that leverage has a more economically significant impact on cash sufficiency perceptions compared to cash holdings.[1] Specifically, a one-standard-deviation increase in cash holdings (0.178) raises the probability of reporting cash as more than sufficient by 2.44 percentage points (0.137 multiplied by 0.178) in column (2) and by 2.92 percentage points for the *Sufficient cash dummy* in column (3), In contrast, a one-standard-deviation increase in *Leverage* (0.237) reduces the probability by 11.10 percentage points (negative 0.468 multiplied by 0.237) for the *More-than-sufficient cash dummy* in column (2) and by 5.62 percentage points for the *Sufficient cash dummy* in column (3). These results show that the effect of leverage on cash sufficiency perceptions is substantially larger in magnitude compared to that of cash holdings.

4.2. Sales Declines due to COVID-19

We examine heterogeneity in sales declines due to COVID-19. The survey provides firm-level assessments on whether firms experienced a decline, no change, or an increase in sales. This self-reported data allows for a direct classification of firms into affected and unaffected groups. In our data, 66.5% of firms reported a sales decline, 29.4% experienced no change, and 4.1% saw an increase.

Table 3 presents results by splitting the sample into firms that experienced sales declines due to COVID-19 (columns 1 to 3) and those that did not (columns 4 to 6). In columns 1 to 3,

[1] We report marginal effects for the binary probit model but not for the ordered probit model due to computational challenges introduced by the inclusion of industry dummies. While the ordered probit model could estimate coefficients, calculating marginal effects requires additional steps that are more prone to numerical instability. A key challenge is that ordered probit estimates three cutoffs to distinguish the four outcome levels, meaning that industry dummies interact with these cutoffs, significantly increasing the number of parameters to be estimated. In contrast, binary probit, which estimates only a single threshold, could compute marginal effects even in the presence of industry fixed effects.

cash holdings show a positive effect on cash sufficiency perceptions; however, this effect is statistically insignificant in column 2. In contrast, leverage consistently demonstrates a strong and significant negative effect across all specifications. For example, in column 2, where the influence of cash is insignificant, a one-standard-deviation increase in leverage reduces the probability of reporting more-than-sufficient cash by as much as 14.13 percentage points (negative 0.596 multiplied by 0.237). This underscores the critical role of leverage in eroding cash sufficiency perceptions during crises.

Columns (4) to (6) make the contrast between cash holdings and leverage even more pronounced. All three columns demonstrate that cash holdings are insignificant, while leverage continues to play a significant role. These findings reinforce that leverage remains a key determinant of cash sufficiency perceptions, even for firms that did not experience sales declines. A key difference from Columns (1) to (3) is that the coefficients on leverage are smaller—approximately one-third of their previous magnitude—suggesting that the negative impact of leverage is stronger among affected firms compared to unaffected firms. This implies that cash flow shocks amplify the adverse effects of leverage on liquidity, making financially stressed firms more vulnerable.

4.3. Projected Recovery Period from COVID-19

The analysis up to this point suggests that concerns about future repayment obligations shape firms' cash perceptions, with leverage playing a central role. The survey captures a more direct connection to future outlooks and reports firms' projections for their recovery period from COVID-19. Figure 3 illustrates the anticipated recovery periods for firms experiencing a sales decline. Among these firms, 7.9% expected to recover shortly, 25.2% anticipated recovery within six months, 34.4% within a year, and 32.4% expected recovery to extend beyond a year. This figure highlights substantial variation in recovery expectations, underscoring the significant uncertainties faced by firms.

Table 4 provides insights into how recovery expectations influence firms' cash sufficiency perceptions relative to those expecting a short recovery. The marginal effects demonstrate a clear pattern: as recovery timelines extend, firms' perceptions of cash sufficiency deteriorate significantly. For instance, from column (2), the likelihood of perceiving more-than-sufficient cash decreases by 17.4 percentage points for firms with the longest recovery expectations. These findings highlight the heightened sensitivity of cash sufficiency perceptions to prolonged recovery timelines, as longer expectations amplify concerns about future uncertainties.

4.4. Debt Categories

Building on the results that emphasize the role of leverage, we examine specific categories of debt. We restrict our analysis to public firms because granular debt data is available only for this group. Specifically, we examine interest-bearing debt, short-term debt, and long-term debt.

In Table 5, across all columns, each category of debt exhibits negative and statistically significant effects on perceptions. A one-standard-deviation increase in interest-bearing debt, short-term debt, and long-term debt reduces the likelihood of perceiving cash as more-than-sufficient by 9.96, 7.30, and 7.18 percentage points, respectively. These results demonstrate the robustness of the negative impact of debt on cash sufficiency perceptions.

In contrast, cash holdings exhibit a weaker and more inconsistent effect. While column (2) shows a positive and statistically significant impact, the effects are insignificant in columns (1) and (3). The results in Column (3) suggest that when both cash and long-term debt are included, the significance of cash disappears, with long-term debt absorbing its explanatory power. This finding is consistent with the results in Table 4, where firms with longer recovery expectations reported significantly lower cash sufficiency perceptions, reinforcing the link between long-term financial outlook and confidence in liquidity.

5. Intended Use of Cash

5.1. Data Description and Estimation

The survey asks firms about their intended use of cash. Firms can choose up to three options from the following 10 categories: i) domestic capital expenditures, ii) mergers and acquisitions (M&A), iii) R&D expenses, iv) human capital investment, v) shareholder payouts, vi) debt repayment, vii) loans to affiliates, viii) working capital, ix) financial asset investment, and x) savings.[2]

Table 1 highlights substantial differences in how firms planned to use their cash, from conservative strategies to more active investment strategies. The most common response was allocating cash to working capital, likely reflecting the significant cash flow shocks experienced during the period. Approximately 30% of firms aimed to save more to maintain liquidity, and 30.8% planned to pay down debt to reduce future financial obligations. Active investment was also prevalent, with over half of the firms (54.4%) intending to allocate cash toward capital expenditures, 16.9% planning to invest in human capital, and 11.4% in R&D. In contrast, shareholder payouts were relatively uncommon, with 10.7% of firms indicating this intention.

Our regression model uses either the four-level cash sufficiency score and cash holdings as primary explanatory variables. We use binary probit regression, with the outcome variable being one of the 10 specified variables. Alternatively, we could use a multivariate probit model to jointly estimate the 10 outcomes while accounting for potential correlations in the unobserved factors across them. However, this approach requires estimating a high-

[2] The survey also includes foreign capital expenditures as an additional option. However, since only 3% of firms planned to allocate cash to this category, we omit it from our estimation due to minimal cross-sectional variation.

dimensional correlation matrix, as well as coefficients for all explanatory variables across multiple equations. With 10 outcomes and 67 industry classifications in our final data, this would result in 670 parameters just for the industry dummies, raising concerns about over-parameterization.

The outcome variable is $Cash\ plan_{ik}$, where each k represents one of the 10 cash allocation plans: i) domestic capital expenditures; ii) mergers and acquisitions (M&As); iii) R&D expenses; iv) human capital investment; v) shareholder payouts; vi) debt repayment; vii) loans to affiliates; viii) working capital; ix) financial asset investment; and x) savings. As independent variables, we include $Cash\ score_i^2$, $Cash\ score_i^3$, and $Cash\ score_i^4$, where each is a dummy variable that equals one if the firm's *Cash sufficiency score* corresponds to the superscripted number (i.e., 2, 3, or 4). We choose not to use the *Cash sufficiency score* directly since it is an ordinal variable, taking discrete values rather than continuous numbers. In summary, we apply Equation (2) when using the *Cash sufficiency score* as the independent variable and Equation (3) when using cash holdings as the independent variable.

$$\begin{aligned}\Pr(Cash\ plan_i = 1) &= \Phi\big[\alpha + \beta_2 Cash\ score_i^2 + \beta_3 Cash\ score_i^3 + \beta_4 Cash\ score_i^4 \\ &\quad + \gamma Leverage_i + \mu_j\big] \qquad (2)\end{aligned}$$

$$\Pr(Cash\ plan_{ik} = 1) = \Phi\big[\alpha + \beta_1 Cash_i + \gamma Leverage_i + \mu_j\big] \qquad (3)$$

5.2. Cash Sufficiency and Business Plans

Table 6 presents the marginal effects based on Equation (2). Columns (1) to (4) examine the relationship between cash sufficiency perceptions and four types of investments. The results show that highest cash sufficiency perceptions (i.e., $Cash\ score_i^4$ equals one) are consistently associated with increased investment activity across all four types. We also observe generally larger coefficients for firms with higher cash scores (3 or 4), suggesting that having sufficient cash is important for investment.

Columns (5) to (10) use different outcome variables. Column (8) shows that firms with the highest cash sufficiency perceptions were significantly less likely to allocate cash to working capital (marginal effect of -15.6 percentage points), suggesting lower liquidity concerns. This finding indicates that firms confident in their cash positions are less inclined to maintain operational liquidity buffers, reflecting their focus on other strategic uses of cash. Moreover, higher cash sufficiency perception did not significantly influence savings, reinforcing that these firms prioritize active corporate behavior rather than precautionary reserves.

5.3. Cash Holdings and Business Plans

Table 7 presents the marginal effects based on Equation (3). The most notable contrast with Table 6 is that firms with higher cash holdings were less likely to allocate cash to capital expenditures. While higher cash holdings are positively associated with human capital investments, this suggests that such firms may prioritize specific investments, like human capital, while adopting a more conservative approach to capital expenditures. Column (10) further supports this interpretation, showing that higher cash holdings lead to increased savings, reinforcing the notion of conservative financial behavior.

6. Conclusion

Our study leverages a unique survey that captures private information on corporate cash holdings, offering insights into how firms assess their liquidity beyond publicly available financial data. By integrating survey responses with financial statements, we reveal that cash sufficiency perceptions play an important role in shaping business strategies. Firms with high actual cash holdings exhibit more conservative financial strategies, prioritizing savings, while those that internally perceive their cash as sufficient allocate funds more actively toward investment. These findings underscore the role of private assessments in understanding corporate decision-making.

Our study contributes to the literature in several ways. First, we provide direct evidence of managerial liquidity assessments, offering a new and straightforward approach to identifying financial constraints beyond traditional measures such as cash flow sensitivity of investment (Fazzari et al. 1988) and cash flow sensitivity of cash (Almeida et al. 2004). Second, we offer an alternative perspective to the conventional agency-based view that high cash levels lead to overinvestment, showing instead that higher cash holdings are associated with managerial conservatism. Third, we highlight the role of leverage in shaping liquidity perceptions, demonstrating that long-term obligations influence how firms internally assess their financial flexibility. Finally, our findings suggest that relying solely on public financial data may not fully capture firms' financial conditions. Private assessments of liquidity, particularly in times of crisis, provide valuable insights that complement traditional financial indicators.

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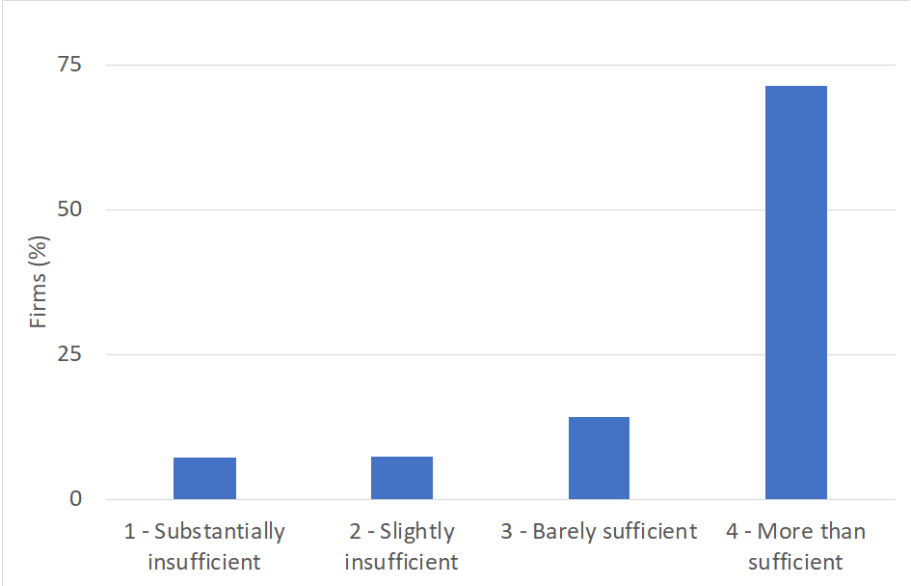
Figure 1: Distribution of Cash Sufficiency Scores

These figures illustrate the distribution of cash sufficiency scores: one for substantially insufficient, two for slightly insufficient, three for barely sufficient, and four for more than sufficient. Panel A includes all firms, and Panel B focuses on firms that experienced sales declines due to COVID-19, accounting for 66.5% of the sample firms.

Panel A: All Firms



Panel B: Firms That Experienced Sales Declines

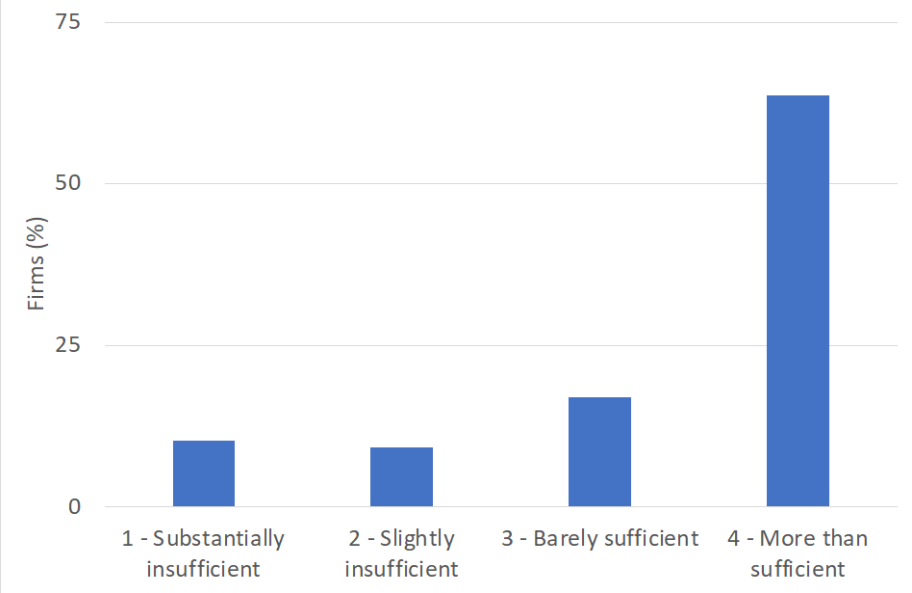


Figure 2: Cash Sufficiency Scores and Cash Holdings

This figure examines the relationship between the cash sufficiency scores and the cash-to-assets ratio. A score of one represents substantially insufficient, two slightly insufficient, three barely sufficient, and four more than sufficient. The box represents the interquartile range, from the first to the third quartile, with the median depicted by a line inside the box. The whiskers extend to 1.5 times the interquartile range above the upper quartile and below the lower quartile. Dots beyond the whiskers indicate outliers.

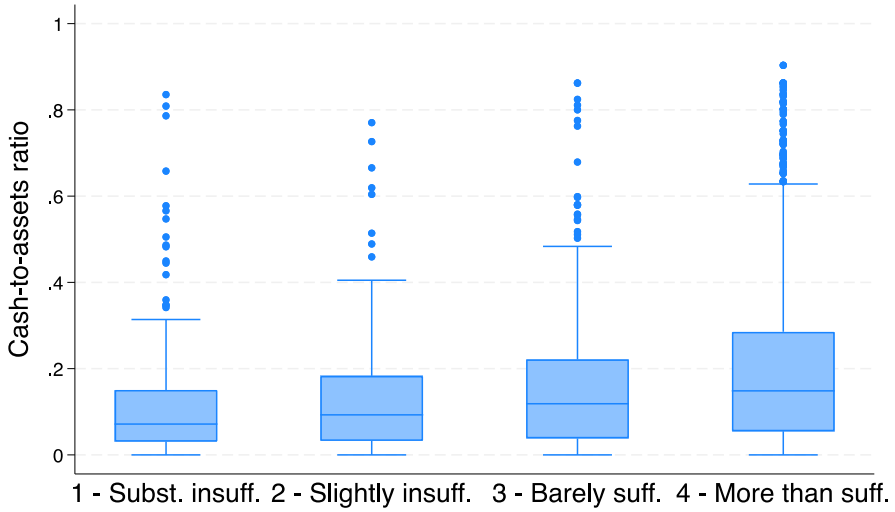


Figure 3: Distribution of Expected Recovery Periods

This figure illustrates the distribution of expected recovery periods from COVID-19. A response of one represents expected recovery shortly, two indicates recovery within six months, three within a year, and four represents recovery extending beyond a year.

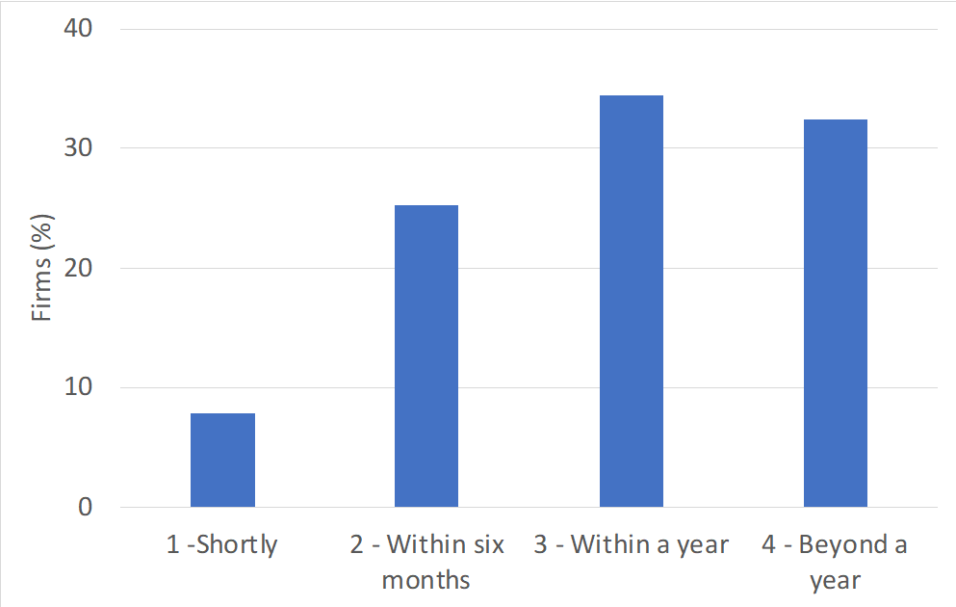


Table 1: Summary Statistics

This table presents summary statistics. We use the July 2020 survey and financial data from the fiscal year 2019. See the appendix for the variable definitions.

	Mean	SD	p25	p50	p75	N
Survey data						
Cash sufficiency score (1 to 4)	3.498	0.908	3	4	4	2813
More-than-sufficient cash dummy	0.714	0.452	0	1	1	2813
Sufficient cash dummy	0.856	0.351	1	1	1	2813
Expected recovery time (1 to 4)	2.852	0.976	2	3	4	1949
Sales decline dummy	0.665	0.472	0	1	1	2813
Survey data – intended use of cash						
Capex	0.544	0.498	0	1	1	2813
M&A	0.055	0.229	0	0	0	2813
R&D	0.114	0.318	0	0	0	2813
Human capital	0.169	0.375	0	0	0	2813
Payout	0.107	0.309	0	0	0	2813
Paydown	0.308	0.462	0	0	1	2813
Internal capital	0.090	0.286	0	0	0	2813
Working capital	0.765	0.424	1	1	1	2813
Financial investment	0.101	0.302	0	0	0	2813
Savings	0.298	0.457	0	0	1	2813
Financial data						
Cash	0.182	0.178	0.046	0.132	0.256	2813
Leverage	0.499	0.237	0.323	0.492	0.671	2813
Interest-bearing debt (public firms)	0.161	0.164	0.02	0.114	0.256	838
Short-term debt (public firms)	0.305	0.143	0.205	0.29	0.39	838
Long-term debt (public firms)	0.152	0.130	0.052	0.115	0.22	838

Table 2: Formation of Cash Perception

This table examines the impact of cash holdings and leverage in 2019 on firms' perceptions of cash sufficiency at the onset of COVID-19. We use ordered probit model in column (1) and the binary probit model in columns (2) and (3). In column (1), the outcome variable is the cash sufficiency score that classifies cash perception into four categories: one for substantially insufficient, two for slightly insufficient, three for barely sufficient, and four for more than sufficient. In columns (2) and (3), the outcome variables are dummies indicating whether the cash perception is viewed as more than sufficient or sufficient. We include industry dummies in regression. Standard errors are clustered at the industry level. Significance at the 1%, 5%, 10% levels are denoted by ***, **, and *, respectively. See the Appendix for the variable definitions.

	Cash sufficiency score	More-than-sufficient	Sufficient cash
	(1)	(2)	(3)
Cash	0.567***	0.478**	0.871***
	(0.197)	(0.196)	(0.290)
Leverage	-1.463***	-1.629***	-1.259***
	(0.153)	(0.172)	(0.178)
Marginal effects			
Cash		0.137**	0.164***
		(0.058)	(0.052)
Leverage		-0.468***	-0.237***
		(0.038)	(0.029)
Industry FE	Yes	Yes	Yes
pseudo R-sq	0.126	0.151	0.183
Estimation	Ordered probit	Binary probit	Binary probit
N	2813	2784	2731

Table 3: Heterogeneity in Sales Declines

This table presents results by splitting the sample into firms that experienced sales declines due to COVID-19 (columns 1 to 3) and those that did not (columns 4 to 6). In columns (1) and (4), the outcome variable is the cash sufficiency score that classifies cash perception into four categories: one for substantially insufficient, two for slightly insufficient, three for barely sufficient, and four for more than sufficient. In the other columns, the outcome variables are dummy variables: columns (2) and (5) indicate whether firms perceive their cash as more than sufficient, while columns (3) and (6) indicate whether they view it as sufficient or better. We include industry dummies in regression. Standard errors are clustered at the industry level. Significance at the 1%, 5%, 10% levels are denoted by ***, **, and *, respectively. See the Appendix for the variable definitions.

	Sufficiency score	More-than-sufficient	Sufficient cash	Sufficiency score	More-than-sufficient	Sufficient cash
	Sales declined			Non-sales declined		
	(1)	(2)	(3)	(4)	(5)	(6)
Cash	0.496**	0.329	0.806***	0.692	0.662	0.952
	(0.214)	(0.230)	(0.275)	(0.614)	(0.582)	(0.960)
Leverage	-1.618***	-1.921***	-1.350***	-0.983***	-1.011***	-0.919**
	(0.172)	(0.207)	(0.204)	(0.284)	(0.313)	(0.402)
Marginal effects						
Cash		0.102	0.182***		0.143	0.119
		(0.071)	(0.062)		(0.126)	(0.119)
Leverage		-0.596***	-0.305***		-0.219***	-0.115**
		(0.057)	(0.043)		(0.066)	(0.050)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Estimation	Ordered probit	Binary probit		Ordered probit	Binary probit	
pseudo R-sq	0.134	0.167	0.190	0.134	0.110	0.105
N	1870	1850	1785	943	769	594

Table 4: Expected Recovery Periods

This table includes firms' expected recovery periods. In column (1), the outcome variable is the cash sufficiency score that classifies cash perception into four categories: one for substantially insufficient, two for slightly insufficient, three for barely sufficient, and four for more than sufficient. In columns (2) to (3), the outcome variables are dummies indicating whether the cash perception is viewed as more than sufficient or sufficient. We include industry dummies in regression. Standard errors are clustered at the industry level. Significance at the 1%, 5%, 10% levels are denoted by ***, **, and *, respectively. See the Appendix for the variable definitions.

	Sufficiency score	More-than-sufficient	Sufficient cash
	(1)	(2)	(3)
Cash	0.511**	0.339	0.816***
	(0.227)	(0.241)	(0.291)
Leverage	-1.680***	-1.999***	-1.393***
	(0.179)	(0.214)	(0.217)
Within 6-month	-0.347**	-0.412***	-0.277
	(0.137)	(0.143)	(0.172)
Within a year	-0.394**	-0.502***	-0.283
	(0.153)	(0.160)	(0.175)
Over a year	-0.541***	-0.605***	-0.423**
	(0.152)	(0.159)	(0.183)
Marginal effects			
Cash		0.104	0.185***
		(0.074)	(0.065)
Leverage		-0.615***	-0.315***
		(0.057)	(0.045)
Within 6-month		-0.114***	-0.055*
		(0.036)	(0.032)
Within a year		-0.142***	-0.057*
		(0.041)	(0.032)
Over a year		-0.174***	-0.090***
		(0.041)	(0.035)
Estimation	Ordered probit	Binary probit	
Industry FE	Yes	Yes	Yes
pseudo R-sq	0.140	0.178	0.197
N	1838	1818	1754

Table 5: Debt Categories

This table analyzes detailed categories of debt. We restrict our analysis to public firms because granular debt data is available only for this group. The outcome variable is the more-than-sufficient cash dummy, and we use the binary probit model. We examine interest-bearing debt in column (1), short-term debt in column (2), and long-term debt in column (3). We include industry dummies. Standard errors are clustered at the industry level. Significance at the 1%, 5%, 10% levels are denoted by ***, **, and *, respectively. See the Appendix for the variable definitions.

	More-than-sufficient		
	(1)	(2)	(3)
Cash	0.553	1.082**	0.664
	(0.556)	(0.539)	(0.585)
Interest-bearing debt	-2.337***		
	(0.448)		
Short-term debt		-1.924***	
		(0.462)	
Long-term debt			-2.057***
			(0.645)
Marginal effects			
Cash	0.144	0.288**	0.178
	(0.144)	(0.142)	(0.157)
Interest-bearing debt	-0.608***		
	(0.106)		
Short-term debt		-0.511***	
		(0.116)	
Long-term debt			-0.552***
			(0.167)
Estimation		Binary probit	
Industry FE	Yes	Yes	Yes
pseudo R-sq	0.153	0.135	0.129
N	738	738	738

Table 6: Intended Use of Cash – Cash Sufficiency

These tables examine the impact of cash perceptions from the July 2020 survey on firms' intended use of cash. Firms choose up to three options from the following 10 categories: i) domestic capital expenditures, ii) mergers and acquisitions (M&A), iii) R&D expenses, iv) human capital investment, v) shareholder payouts, vi) debt repayment, vii) lending to affiliates through the internal capital market, viii) working capital, ix) financial asset investment, and x) savings. In all regressions, we use the binary probit model and include industry dummies. Standard errors are clustered at the industry level. Significance at the 1%, 5%, 10% levels are denoted by ***, **, and *, respectively. See the Appendix for the variable definitions.

	Capex	M&A	R&D	Human capital	Payout	Paydown	Internal capital	Working capital	Financial investment	Savings
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Slightly	0.118***	0.086	0.076*	0.027	-0.031	-0.023	-0.044	0.077	-0.025	-0.004
insufficient	(0.045)	(0.059)	(0.044)	(0.055)	(0.041)	(0.045)	(0.034)	(0.056)	(0.055)	(0.044)
Barely	0.160***	0.087	0.122**	0.092*	0.009	-0.046	-0.055**	-0.042	0.066*	-0.006
sufficient	(0.049)	(0.060)	(0.050)	(0.054)	(0.034)	(0.039)	(0.027)	(0.040)	(0.039)	(0.037)
More than	0.148***	0.119**	0.092**	0.102**	0.060*	-0.141***	-0.026	-0.156***	0.113***	0.001
sufficient	(0.046)	(0.053)	(0.037)	(0.050)	(0.035)	(0.035)	(0.025)	(0.038)	(0.036)	(0.033)
Leverage	-0.200***	-0.092***	-0.161***	-0.053	-0.136***	0.622***	0.001	0.186***	-0.173***	-0.181***
	(0.054)	(0.030)	(0.054)	(0.033)	(0.026)	(0.041)	(0.036)	(0.045)	(0.043)	(0.040)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	2783	1661	2097	1921	2661	2656	2779	2618	2763	2594

Table 7: Intended Use of Cash – Cash Holdings

These tables examine the impact of cash perceptions from the July 2020 survey on firms' intended use of cash. Firms choose up to three options from the following 10 categories: i) domestic capital expenditures, ii) mergers and acquisitions (M&A), iii) R&D expenses, iv) human capital investment, v) shareholder payouts, vi) debt repayment, vii) lending to affiliates through the internal capital market, viii) working capital, ix) financial asset investment, and x) savings. In all regressions, we use the binary probit model and include industry dummies. Standard errors are clustered at the industry level. Significance at the 1%, 5%, 10% levels are denoted by ***, **, and *, respectively. See the Appendix for the variable definitions.

	Capex	M&A	R&D	Human capital	Payout	Paydown	Internal capital	Working capital	Financial investment	Savings
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Cash	-0.132**	0.040	0.082	0.220***	-0.067*	-0.398***	-0.300***	0.044	0.092***	0.381***
	(0.066)	(0.027)	(0.055)	(0.049)	(0.034)	(0.058)	(0.055)	(0.039)	(0.035)	(0.062)
Leverage	-0.257***	-0.102***	-0.147***	-0.009	-0.187***	0.602***	-0.070*	0.275***	-0.180***	-0.078*
	(0.050)	(0.029)	(0.048)	(0.031)	(0.029)	(0.038)	(0.037)	(0.049)	(0.045)	(0.043)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	2783	2097	1921	2661	2656	2779	2618	2763	2594	2761

Appendix: Variable Definition

	Definition
Survey data	
Cash sufficiency score (1 to 4)	Classifies cash perception into four categories from the July 2020 survey: one for substantially insufficient, two for slightly insufficient, three for barely sufficient, and four for more than sufficient
More-than-sufficient cash dummy	A dummy variable that equals one for a score of four and zero for all other scores.
Sufficient cash dummy	A dummy variable that assigns a value of one to scores of three or four and zero to lower scores.
Expected recovery time (1 to 4)	One indicates expected recovery shortly, two for expected recovery within six months, three for within a year, and four for expected recovery from COVID-19 extending beyond a year.
Sales decline dummy	A dummy that takes a value of one if the firm reports sales declines due to COVID-19.
Survey data – intended use of cash	
Capex	Use for capital expenditures
M&A	Use for mergers and acquisitions
R&D	Use for R&D
Human capital	Use for human capital investment
Payout	Use for shareholder payouts
Paydown	Use for debt paydowns
Internal capital	Use for internal capital markets
Working capital	Use for working capital needs
Financial investment	Use for financial asset investment
Savings	Use for cash savings
Financial data	
Cash	Cash to assets ratio
Leverage	Total liabilities to assets ratio
Interest-bearing debt (public firms)	Interest-bearing debt to assets ratio
Short-term debt (public firms)	Short-term debt to assets ratio
Long-term debt (public firms)	Long-term debt to assets ratio