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ORIGINAL RESEARCH

Determinants of corporate cash holdings in private and public companies: insights from Latin America

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Abstract
Despite growing academic and media interest in cash management, little is known about the cash-holding behavior of private firms, particularly in emerging economies, and the influence of the cost of carrying cash on their cash levels. This study addresses this gap by analyzing the determinants of cash holdings in private and public companies within the Latin American setting. Additionally, it investigates whether Latin American private firms maintain lower or higher cash holdings than their public counterparts. The findings challenge Keynes' (The general theory of employment, interest and money, McMillan, London, 1936) precautionary motive for holding cash, demonstrating that private firms hold significantly lower cash levels than public firms under conditions of costly external financing. This disparity is attributed to the elevated costs of carrying cash stemming from restricted access to external funding, higher transaction costs, and pronounced information asymmetry, which amplify cash management challenges for private firms. The findings persist across various robustness checks, including propensity score matching and Heckman's (Econometrica 47:153–161, 1979) two-step treatment effect model. Our research contributes to the literature on cash holdings by highlighting the crucial role of the cost of carrying cash in shaping cash levels in private versus public companies. By presenting a theoretical framework that explains the divergent cash-holding behaviors between private and public companies, our study provides a detailed understanding of the determinants of cash management decisions. The insights presented enrich the discussion of cash management and underscore the unique challenges private firms face in emerging markets.

Keywords Cash holdings · Private firms · Emerging markets · Financial constraints · Agency conflicts

JEL Classification G30; G32

1 Introduction

A central question in corporate finance is related to how much of its total assets a firm should keep in the form of cash and cash equivalents to maximize its value. How a company manages corporate cash holdings is an important concern to managers, researchers,

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investors, and policymakers. For example, managers must ensure that they have enough cash holdings within the firm to take advantage of growth opportunities and overcome unforeseen problems. In this regard, many Chief Financial Officers (CFOs) consider decisions about cash levels to be among the most relevant they make in imperfect capital markets (Almeida et al. 2014; Bates et al. 2018; Graham and Leary 2018; Cardella et al. 2021; Manoel and Moraes 2022a; Anderson et al. 2024). A large body of literature has recently emerged to increase the understanding of the firm, industry, and country-level factors that explain why companies around the world maintain considerable amounts of cash on their balance sheets (Chung et al. 2015; Brick and Liao 2017; Harford et al. 2017; Bates et al. 2018; Faulkender et al. 2019; Deloof et al. 2020; Manoel and Moraes 2022b; Chen et al. 2023; Fabrizi et al. 2023; Amberger and Robinson 2024; Darmouni and Mota 2024; Khokhar et al. 2024).

Although liquidity management has become a significant research topic, the extant literature reveals several notable gaps. For instance, despite increasing efforts to understand firms' cash holdings, empirical studies predominantly concentrate on publicly traded companies, primarily due to the scarcity of available data for private firms (Gao et al. 2013; Drobetz et al. 2019; Eskandari and Zamanian 2022). Furthermore, the limited literature on corporate cash holdings among private firms, while offering valuable insights, generally focuses on individual developed countries (Bigelli and Sánchez-Vidal 2012; Gao et al. 2013), particularly the U.S. context (Gao et al. 2013). These contexts often differ significantly from those of private firms in emerging economies, highlighting a critical area for further research.

The lack of research on privately held firms is particularly notable, given that these firms represent a significant segment of any free-market economy. Moreover, the rise of companies from emerging markets is a critical factor in the globalization of the world economy (Deloof et al. 2020; Manoel and Moraes 2022b). In the present article, we aim to fill this void in the empirical literature on corporate cash holdings by analyzing cash and its determinants in private and public companies in the Latin American setting. We also investigate whether Latin American privately held firms maintain lower or higher cash holdings than their public counterparts. Toward our objective, we used a comprehensive sample of private and public companies from the six largest Latin American economies for which we were able to construct a representative sample: Argentina, Brazil, Chile, Colombia, Mexico, and Peru. All data are from the Capital IQ database. Our final sample comprises an unbalanced panel data of 7,222 Latin American firms (46,040 firm-year observations) with annual data available from 2000 through 2019.

Private firms outnumber public companies, employ a substantial workforce, and are vital to the overall functioning of any economy (Gogineni, Linn, and Yadav, 2012; Denis 2024). Accordingly, research involving privately held firms is of significant interest to stakeholders (Gao et al. 2013; Mortal and Reisel 2013; Gogineni et al. 2022; Denis 2024). However, studies focused on publicly traded companies may not be generalizable to private firms, as the two differ in several key aspects. One major distinction is their ownership structure and the degree to which shareholders prioritize control. Public firms typically have thousands of shareholders, while private firms generally have only a few (Brav 2009; Denis 2024). Additionally, because managers and owners are often the same individuals in privately held firms, these companies tend to experience lower levels of manager-shareholder agency conflicts compared to publicly listed firms (Brav 2009).

Another relevant distinction is the level of information asymmetry, given that private firms are generally more opaque to outsiders. Additionally, cash holdings may be particularly relevant for private firms because they generally have less access to external funds at

fair terms. Whereas managers in public companies can usually smooth their activities and invest when appropriate by accessing public markets, private firm managers have to rely more on cash holdings and current cash flow. All these factors are likely to impact the cash policies of private firms relative to their public counterparts (Brav 2009; Gogineni et al. 2012; Manoel et al. 2017; Deloof et al. 2020).

Furthermore, cash holdings can vary significantly across countries due to institutional differences that influence firms' characteristics (Almeida et al. 2014; Pinkowitz, Stulz, and Williamson, 2016; Jayakody et al. 2023). Factors such as varying access to external funds, differing levels of financial institution development, and disparities in creditor protection can affect the proportion of total assets held as cash and cash equivalents by public and private firms in emerging economies. Therefore, it is crucial to distinguish the differences in corporate cash holdings between private and public companies in emerging markets and to examine how these differences compare with those in more or less developed capital markets (Hall et al. 2014).

It is also relevant to note that some notable differences in the findings across studies can be observed. For example, using a wide panel of data on Central and Eastern European firms from 2001 to 2010, Hall et al. (2014) document that private firms tend to hold more cash holdings than public companies. Gao et al. (2013) and Mortal et al. (2020), on the other hand, observe that public companies in the U.S. and Europe, respectively, hold significantly more cash holdings than their private peers. Such differences highlight the need for more cross-country studies comparing cash holdings among private and publicly listed companies, such as our own research. In this respect, Bettis et al. (2016) highlight the relevance of establishing the external validity of previous studies. Our research consequently allows us to reconcile mixed conclusions in the vast literature on corporate cash holdings.

Our study builds upon the work of Gao et al. (2013), Hall et al. (2014), and Mortal et al. (2020), whose papers are most closely aligned with ours, offering valuable insights into cash-holding behaviors across different regions. While Hall et al. (2014) found that private firms in Central and Eastern Europe hold more cash than their public counterparts, Gao et al. (2013) and Mortal et al. (2020) document the opposite trend in the U.S. and Europe. By focusing on Latin America, a region often overlooked in this research area, our study provides a fresh perspective on the factors influencing cash holdings in private and public firms. It also highlights the distinct challenges firms face in emerging markets, contributing to a broader understanding of cash management.

Latin America presents a unique and valuable research setting due to its distinct institutional environment compared to developed economies such as the U.S. and Europe. Significant differences include less developed financial markets, weaker investor protection, higher levels of corruption, and more pronounced information asymmetries (Chong and Lopez-de-Silanes 2007; Aguinis et al. 2020). For example, inadequate investor protection in Latin America imposes greater constraints on firms seeking external funds, necessitating higher cash reserves to seize growth opportunities that might otherwise be missed due to the high cost of external financing (Khurana et al. 2006; Manoel and Moraes 2022a). However, empirical literature also suggests that holding cash can incur costs, particularly when external funds are restricted or expensive, resulting in substantial opportunity costs associated with maintaining cash balances (Khurana et al. 2006; Mortal et al. 2020). These institutional factors can lead to different financial behaviors, impacting cash management practices in both public and private companies.

Secondly, Latin America is posited as a suitable research environment due to its relative homogeneity within the continent (Cuervo-Cazurra 2016; Aguinis et al. 2020). Countries in this region share many similarities, including historical backgrounds, economic and

political development, geographical characteristics, and socio-cultural attributes, which are less comparable across African, Asian and European nations. This increased homogeneity within a Latin American sample enhances cross-country comparability, effectively controlling for certain confounding effects, particularly those related to the institutional environment that may influence the determinants of corporate cash holdings (Cuervo-Cazurra 2016; Aguinis et al. 2020). Therefore, examining the Latin American context permits a more precise evaluation of the impact of a company's public or private status on cash balances while reducing the potential influence of other factors on our estimates.

Last but not least, despite the significant economic role of Latin American countries, the region has been largely overlooked in the cash management literature (Manoel and Moraes 2022a, 2022b). Remarkably, there is no investigation into whether privately held firms in Latin America maintain higher or lower cash reserves than their public counterparts. Resolving the issue of whether private firms hold less cash holdings in relation to their public counterparts is relevant in understanding the cash holdings of these firms and the determinants of cash holdings in general. Furthermore, this extension is crucial for developing a global perspective on corporate cash holdings, highlighting both similarities and differences across diverse economic and institutional settings. In summary, Latin America is an under-researched region with significant potential to provide valuable insights into cash management practices (Cuervo-Cazurra 2016; Aguinis et al. 2020; Manoel and Moraes 2022a, 2022b).

After controlling for firm-specific characteristics and for country-level variables identified by prior research as relevant in determining cash levels, we find that Latin American private firms hold significantly less cash holdings than their public counterparts. Therefore, even though private firms generally have less access to external funds and would be expected to have a higher precautionary saving motive to hold cash, we find that they hold proportionally less cash than their public counterparts.

In our primary analyses, we employ Ordinary Least Squares (OLS) regressions with country, industry, and year fixed effects. However, our main conclusions remain consistent when using firm fixed effects and the Weighted Least Squares (WLS) methodology. Additionally, we conduct a series of robustness checks to validate our main findings further. These include employing a propensity score matching (PSM) approach to address selection concerns based on observable firm characteristics and utilizing Heckman's (1979) two-step treatment effect model to account for selection biases arising from unobservable factors.

After obtaining empirical evidence consistent with our arguments, we further examine the cash flow sensitivity of cash and debt for both private and public companies. This analysis aims to understand why Keynes' (1936) precautionary saving motives for holding cash do not lead private firms in our setting to hold substantially more cash than their public peers. In particular, we provide novel evidence that private firms in Latin America have a positive cash flow sensitivity of cash, i.e., they build their cash holdings using internal cash flows. In contrast, public companies' cash holdings are not systematically related to cash flows. The above results are consistent with the view that private firms are more financially constrained than their public counterparts. Moreover, we document that privately held firms display a negative cash flow sensitivity of debt, i.e., they use their cash flow to cut down debt. Latin American public companies, however, do not rely on their cash flows to pay off debt.

Our analysis of the cash flow sensitivity of cash and debt for public and private firms in Latin America makes it clear that private firms have to rely on internal cash flows to both reduce debt and restore cash reserves, revealing that they incur higher costs of carrying cash. Thus, these companies are normally limited by their internal cash flows

to take advantage of their attractive growth opportunities and finance day-to-day operations. On the other hand, public companies can use external sources, such as accessing public equity markets when needed, to cut down debts and build cash holdings. Therefore, easier access to external funds allows publicly traded companies in Latin America to rely less on their cash flows and incur lower costs of carrying cash. Private firms' higher opportunity cost of holding cash, therefore, impairs the ability of these companies to respond to the precautionary motive for having higher cash reserves. Thus, consistent with the prediction that holding cash is excessively costly for Latin American private firms, we empirically demonstrate that they retain substantially less cash holdings than their public counterparts because the high costs of carrying cash overwhelm the precautionary reasons for holding cash in this setting.

Our findings collectively challenge previous research on liquidity management, which asserts that firms with limited access to external financing should maintain higher precautionary cash reserves (e.g., Almeida et al. 2004; Denis and Sibilkov 2010; Acharya and Steffen 2020; Eskandari and Zamanian 2022). Contrarily, our empirical evidence demonstrates that in extreme scenarios where external funds are prohibitively expensive, private firms hold significantly lower cash levels compared to their public counterparts due to the elevated costs associated with holding cash. This evidence diverges from Keynes' (1936) notion of precautionary demand for cash balances, suggesting that when faced with costly external financing, private firms substantially reduce their precautionary cash holdings due to the higher cost of carrying cash.

This paper provides several important contributions to the literature. First, despite the importance of privately held firms in most economies, only a handful of prior research has examined the determinants of cash levels in private firms. Thus, in using a dataset of privately held companies from the six largest Latin American economies, we join a recent surge of articles using data on private firms to draw new insights into publicly traded companies' behavior (Gao et al. 2013). Second, this is the first study to examine the determinants of cash levels in a comprehensive sample of private firms from emerging markets. Then, we contribute to the literature by improving the understanding of the determinants of corporate cash holdings in private and public firms from emerging economies. Third, our sample allows us to establish the generalizability of prior evidence with a limited set of single-developed country studies about private firms.

Fourth, our empirical findings reveal a distinctive trend: privately held firms in Latin America exhibit a significant propensity to accumulate cash reserves from their cash flows, diverging from the behavior observed in public companies. This observation extends the existing literature by elucidating the concept of higher cash-carrying costs for private firms, thus providing a theoretical framework to explain the divergent cash-holding behaviors between private and public enterprises in the Latin American context. This novel insight adds depth to discussions on the determinants of cash management decisions and highlights the unique challenges private firms face in managing their cash reserves.

Fifth, our results also shed light on whether emerging economies have some common characteristics in the cash management of private and public corporations. As a result, this article will also be interesting for policymakers and academics, leading to further discussions on corporate cash holdings. Finally, our study offers practical insights for both managers and policymakers. We provide compelling evidence that firms' cash reserves are notably shaped by the business environment. These findings underscore the importance of contextual factors in shaping strategies for cash management. Therefore, managers and policymakers should take into account the unique challenges and cost considerations

associated with cash management in different organizational settings when formulating strategies for cash management.

This research continues as follows: In Sect. 2, we develop the research hypothesis. In Sect. 3, we present the sample and the variables used. Section 4 describes the results and the robustness checks. Section 5 examines the cash flow sensitivity of debt and cash for private and public companies. Finally, Sect. 6 concludes the article.

2 Hypothesis development

In the absence of market imperfections, a firm's decision regarding cash levels would not impact its value, as external financing would always be readily available at a reasonable cost. In such a theoretical scenario, firms could fund all positive net present value (NPV) projects, irrespective of their cash holdings. However, in the real world, factors such as taxes, information asymmetries, and agency problems mean that decisions about the amount of assets a firm should hold in the form of cash and cash equivalents do indeed affect its value (Myers and Majluf 1984; Kim et al. 1998; Opler et al. 1999; Dittmar and Mahrt-Smith 2007; Martínez-Sola et al. 2013).

The empirical literature on cash holdings identified three main reasons companies keep part of their total assets in the form of cash and cash equivalents. The first motive is called precautionary. Firms stockpile cash under the precautionary motive to protect themselves against adverse cash flow shocks that might force them to forgo positive NPV projects, especially during periods of poor business conditions. Second, for transactional motives, companies hold cash to meet the needs that come from their normal activities without having to liquidate assets. Finally, in addition to the precautionary and transactional reasons, firms also hold cash to take timely advantage of their growth opportunities that might otherwise be forgone due to restricted or excessively costly access to external financing. The literature refers to this as the speculative motive for holding cash (Keynes 1936; Opler et al. 1999; Bates et al. 2009; Martínez-Sola et al. 2013; Iskandar-Datta and Jia 2014; Graham and Leary 2018; Mortal et al. 2020; Darmouni and Mota 2024; Khokhar et al. 2024).

The existence of the aforementioned benefits renders cash holdings valuable to shareholders. However, cash can also be a double-edged sword (Opler et al. 1999; Myers and Rajan 1998; Almeida et al. 2014). The literature identifies two main costs associated with holding cash reserves. First, maintaining liquid assets incurs an opportunity cost, as cash typically earns a low rate of return compared to more productive but less liquid assets; this is referred to as the cost of carry (Kim et al. 1998; Dittmar et al. 2003; Cardella et al. 2021). Second, cash holdings can raise agency concerns between managers and shareholders due to managerial discretion. The free cash flow theory (Jensen 1986) posits that cash can be detrimental to companies since it implies agency costs. This situation arises because cash is particularly susceptible to opportunistic behavior by entrenched managers, as access to cash often faces minimal scrutiny, and its use is discretionary. For instance, self-interested managers may be incentivized to invest in negative NPV projects or engage in behaviors that benefit themselves without creating value for shareholders. Such behaviors may include the consumption of perquisites, excessive compensation, or outright theft. Therefore, when agency problems stemming from the separation of ownership and control are pertinent, opportunistic managers can more easily derive private benefits from cash resources to pursue personal objectives instead of maximizing shareholders' wealth (Jensen and Meckling 1976; Jensen 1986; Myers and Rajan 1998; Dittmar and Mahrt-Smith 2007;

Harford et al. 2008; Iskandar-Datta and Jia 2014; Manoel and Moraes 2022a; Manoel et al. 2023; Anderson et al. 2024).

Considering the above, cash holdings present both benefits and costs to shareholders, requiring firms to balance these factors in their cash policies (Kim et al. 1998; Graham and Leary 2018). As noted, corporate liquidity decisions are influenced by market imperfections such as information asymmetry and agency conflicts, which prevent firms from securing external funds promptly (Myers and Majluf 1984; Opler et al. 1999). In this context, Arslan et al. (2006) suggest that companies facing greater market imperfections maintain larger cash holdings, as cash enables them to pursue attractive projects when internal funds are insufficient and external funds costly. Consequently, given that private firms are generally more vulnerable to market imperfections, one would expect them to have a higher precautionary demand for cash than public companies (Arslan et al. 2006; Brav 2009; Gao et al. 2013; Deloof et al. 2020).

Supporting this explanation, Hall et al. (2014) found that private companies in Central and Eastern Europe held significantly more cash reserves than public companies from 2001 to 2010, attributing this to the easier access public companies have to capital markets. However, Gao et al. (2013) found that U.S. private firms hold less cash than public firms despite limited access to external funds. They suggest that lower agency costs in privately held firms, due to concentrated ownership, reduce managers' incentives to maintain higher cash reserves. Thus, U.S. public companies hold more cash due to agency issues despite private firms' higher precautionary demand.

The aforementioned evidence indicates a clear tradeoff between agency conflicts and precautionary motives on cash behavior between public and private firms. On the one hand, if the precautionary motive for cash holdings dominates the agency concerns for private firms, then these firms should hold substantially more cash holdings relative to public companies. On the other hand, if the agency's explanation for holding cash dominates the precautionary demand, then private firms should maintain lower cash levels than public companies. To sum up, due to financial constraints' private firms may have greater precautionary demand for cash holdings relative to public firms, but at the same time, the former may have lower agency problems, which leads to lower cash savings (Gao et al. 2013; Hall et al. 2014).

Another relevant factor that can influence the cash levels of private firms relative to public companies is the cost of holding cash. In this regard, Mortal et al. (2020) suggest that in extreme cases, when external funds are excessively costly, firms retain substantially small levels of cash because the opportunity cost of accumulating cash is high. Moreover, the high cost of cash may impair the ability of privately held companies to meet the precautionary reasons for accumulating cash (Mortal et al. 2020). Consistent with the hypothesis that holding cash is relatively costlier for private firms, Mortal et al. (2020) provide evidence that European private firms hold significantly less cash reserves than their public counterparts. For that, they used a sample of non-financial firms from Western European countries over the 1996–2011 period. Similarly, Denis and Sibilkov (2010) note that financially constrained firms often maintain low cash reserves despite their importance, attributing this behavior to poor financial health, which limits their ability to accumulate cash.

In the Latin American context, we expect private firms to maintain lower cash levels relative to their public peers. As mentioned previously, Latin America is characterized as an underdeveloped market where firms often have less access to external capital at fair terms. In this setting, greater cash holdings allow companies to avoid underinvestment and reduced growth (Manoel and Moraes 2022a). However, one cannot ignore that private firms are more constrained in accessing external funds relative to public companies,

in a context where both private and public Latin American companies already face more difficulties in raising external financing compared to corporations from developed countries. Hence, the higher level of financial constraints faced by many Latin American private firms may imply that they are unable to meet their precautionary demand for cash due to the higher cost of carrying cash.

Furthermore, public companies, frequently subjected to stringent regulatory and disclosure requirements, may be motivated to hold higher cash reserves as a signal of financial health and stability to their investors. In contrast, private firms, which do not face the same level of scrutiny and external pressures, tend to prioritize operational investments over substantial cash reserves. This preference is primarily driven by their restricted access to external financing and the prohibitive costs associated with obtaining such funds. Based on the aforementioned arguments, our research hypothesis is:

H1 *Ceteris paribus*, Latin American private firms hold significantly less cash holdings than their public counterparts.

3 Research methodology

3.1 The sample

Our initial sample consists of all firms from the six largest Latin American economies (Argentina, Brazil, Chile, Colombia, Mexico, and Peru), for which annual data are available on the Capital IQ database.[1] We opt to limit our sample to these countries mainly for two reasons. First, due to their relevance in the Latin American economy. Second, we were able to construct a significant sample size of private and public companies from these countries. The sample includes public and private[2] companies from these countries for the period 2000–2019. The data include surviving and non-surviving firms that appear on the Capital IQ database at any time in the sample period to mitigate the concern of survivorship bias. All data are in USD.

It's important to highlight that the Capital IQ database provides only current information regarding the legal structure of companies, categorizing them as either private or public. This means that it reflects the current status of a company at the time of data retrieval rather than its historical status. To illustrate, if a company underwent an Initial Public Offering (IPO) in 2010 but has data available from 2000 to 2019, Capital IQ would classify it as public for the entire period despite its private status prior to the IPO. To address this limitation and ensure the accuracy of our analyses, we supplement the Capital IQ data with additional information on IPOs and delistings from each stock exchange. This allows us to reclassify each firm-year observation based on its actual public or private status at any given time. By cross-referencing each firm's IPO and delisting dates, we can accurately determine its legal structure for each year in our dataset.

Consistent with prior empirical literature (e.g., Opler et al. 1999; Foley et al. 2007; Bates et al. 2009; Fabrizi et al. 2023; Jayakody et al. 2023; Anderson et al. 2024; Darmouni and Mota 2024; Khokhar et al. 2024), we exclude financial companies from the initial sample

[1] Capital IQ is an affiliate of Standard & Poor's, which produces the Compustat database (Gao et al. 2013).

[2] To be included in Capital IQ's database as a private firm, the company cannot be a law firm, investment bank, accounting firm, or equity research provider.

because they hold cash to maintain reserve requirements. We also remove utility firms from our sample because they are subject to regulatory supervision. Finally, we exclude firms with negative equity to avoid capturing effects related to financial stress (e.g., Opler et al. 1999; Foley et al. 2007; Bates et al. 2009). After applying these filters, we built an unbalanced panel data comprising 7,222 unique Latin American firms (46,040 firm-year observations). Among 46,040 firm-year observations, 37,619 firm-year observations are of private firms, and 8,421 are of public companies.

In our dataset, Brazil stands out with the largest number of observations, totaling 32,684 firm-year observations, followed by Chile (5,046), Mexico (2,702), Peru (2,379), Argentina (2,194), and Colombia (1,045). This distribution aligns with typical patterns observed in international datasets, where one country often dominates in terms of data volume compared to others in the region. However, in the robustness subsection of our study, we carefully demonstrate that our main findings remain robust and are not influenced by Brazil's greater representation in the sample.

For our main analyses, we opt to examine the full sample rather than employing the PSM approach to create a matched sample for several reasons. First, the literature on cash management and studies comparing public and private firms lacks consensus on the optimal application of PSM. While some studies incorporate it in their primary analyses (e.g., Gao et al. 2013; Drobetz et al. 2019; Mortal et al. 2020), others use it as a secondary validation technique (e.g., Bharath and Dittmar 2010). Second, PSM reduces sample size by limiting the analysis to matched firms, which poses a challenge in our study due to the limited sample size. Analyzing the full, unmatched sample, however, allows for the inclusion of a broader range of firm characteristics, thereby enhancing the external validity of the findings and ensuring a more comprehensive analysis. Third, using a matched sample for the primary analysis could weaken statistical power, yield less precise estimates, and constrain the generalizability of the results. Although matching addresses endogeneity concerns, it risks excluding valuable insights from the unmatched portion of the dataset.

It is also important to note that while PSM addresses observable differences, it does not fully account for unobservable factors influencing self-selection. Emphasizing PSM in the main analysis could lead to an incomplete understanding of broader effects that are better captured using the full-sample approach. Additionally, the reliability of PSM is highly dependent on the choice of matching variables, and biases in variable selection can affect the results. Therefore, careful attention to selecting and interpreting these variables is crucial when employing matched samples. In summary, by opting to use PSM as a robustness check rather than incorporating it into the main analysis, we preserve the full sample's statistical power and external validity while addressing potential endogeneity threats.

3.2 Variables

3.2.1 Dependent variable

In alignment with the seminal research of Opler et al. (1999), our regression model employs the natural logarithm of the ratio of cash and cash equivalents[3] to net assets[4] as the

[3] Per the guidelines outlined in International Accounting Standard (IAS) 7, "Statement of Cash Flows," it is specified that the variable "cash and cash equivalents" within the Capital IQ database does not include restricted cash.

[4] Furthermore, unreported results, omitted for brevity, indicate that our primary findings remain robust when normalizing the dependent and explanatory variables using lagged net assets instead of net assets.

principal dependent variable. Here, net assets represent total assets minus cash and cash equivalents. This measure is a consolidated measure of corporate cash holdings, thereby circumventing potential spurious associations with size and other variables scaled by total assets. Additionally, by logarithmically transforming this dependent variable, the influence of extreme values on the estimates is attenuated, as corroborated by previous studies (e.g., Opler et al. 1999; Dittmar et al. 2003; Foley et al. 2007).

To further validate our findings, we adopt an alternative measure of cash holdings, as suggested by Ozkan and Ozkan (2004), Harford et al. (2008), Bates et al. (2009), Hall et al. (2014) and Manoel and Moraes (2022a). This measure is calculated as the ratio of cash and cash equivalents to total assets, providing a distinct definition of cash reserves. In the robustness checks subsection, we demonstrate that our primary results persist when employing this alternative measure, thereby enhancing the overall robustness of our findings.

3.2.2 Independent variable

Our main interest variable is the *ListedCompanies* dummy variable that takes the value of 1 for Latin American public firms and 0 for their private counterparts.

3.2.3 Firm-level control variables

The regression model includes a comprehensive set of control variables identified in the literature (e.g., Opler et al. 1999; Dittmar et al. 2003; Almeida et al. 2004; Ozkan and Ozkan 2004; Dittmar and Mahrt-Smith 2007; Bates et al. 2009; Al-Najjar 2013; Manoel and Moraes 2022b) as key determinants of corporate cash holdings. These variables encompass firm size, a dividend dummy, cash flow, net working capital (NWC), growth opportunities, short-term debt (STD), leverage, return on assets (ROA), tangibility, and firm age. "Appendix" details the theoretical justification for incorporating each variable and outlines the anticipated relationships between these factors and corporate cash levels. The definitions of these variables are provided in Table 1. In order to alleviate the undue effects of outliers and possible data errors, we winsorize all continuous variables throughout the analyses at the 1st and 99th percentile levels of their distributions.

3.2.4 Country-level institutional control variables

In addition to the aforementioned firm-level control variables, we also include the following country-level institutional control variables:

Investor Protection: Dittmar et al. (2003) document that investor protection (shareholder rights) explains a significant portion of the cross-country variation in cash holdings. The anti-director rights index is an "aggregated" index of shareholder rights. This index measures how strongly a legal system favors minority shareholders over managers or dominant shareholders in corporate decision-making (La Porta, Lopez-de-Sinales, Shleifer, and Vishny, 1998). In this sense, we add shareholder rights (Anti-director rights index) from La Porta et al. (1998) as an additional country-level institutional control variable.

Worldwide Governance Indicators (WGI) index: following Kraay, Kaufmann, and Mastruzzi (2010) and Pinkowitz et al. (2016), we also control for the average of six corporate governance indices from the World Bank. The World Bank's WGI index provides

Table 1 Description of the variables

Variables	Abbreviation	Operational definition
Cash Holdings	Cash	Natural log of (Cash and Cash Equivalents/Net Assets)
Net Assets	Net Assets	Total Assets net of Cash and Cash Equivalents
Dummy Public Company	Listed Companies	An indicator for the firm being listed = 1; otherwise = 0
Size	Size	Natural logarithm of Net Assets
Dividend dummy	DIV	If the firm paid a dividend in the year = 1; otherwise = 0
Cash Flow	Cash Flow	Cash Flow/Net Assets
Net Working Capital	NWC	(Non-Cash Current Assets—Current Liabilities)/Net Assets
Growth Opportunities	Growth Opportunities	The yearly growth rate of a firm's sales
Short-Term Debt	STDEBT	Short-Term Debt/Net Assets
Leverage	Leverage	The ratio of Total Debt/Net Assets
Return on Assets	ROA	Operating Income/Net Assets
Tangibility	Tangibility	Tangible assets are measured as the ratio of net PPE, which is property, plant, and equipment net of accumulated depreciation, to net assets
Age	Age	Natural logarithm of firm age
Investor Protection (Shareholders Rights)	Investor Protection	This index measures how strongly a legal system favors minority shareholders over managers or dominant shareholders in corporate decision-making, including the voting process. The Investor Protection (Shareholder Rights) variable goes from zero to five (La Porta et al. 1998)
The Worldwide Governance Indicators (WGI) index	WGI	WGI is the equal-weighted average of the six components of the Worldwide Governance Indicators: (1) Voice and Accountability, (2) Political Stability and Absence of Violence/Terrorism, (3) Government Effectiveness, (4) Regulatory Quality, (5) Rule of Law and (6) Control of Corruption
GDP Growth	GDP	Growth in GDP per capita, obtained from the World Bank

Presents the description of the variables used in this paper. All financial variables are expressed in USD. To alleviate the undue effects of outliers and possible data errors, we winsorize all continuous variables at the 1st and the 99th percentile levels

a summary of the country's overall governance quality. The data of the WGI index are from the World Bank Development Indicators database. The WGI index ranges between -2.5 and 2.5. A lower index indicates weak governance, while a higher index indicates more robust governance.

Gross Domestic Product (GDP) Growth: Macroeconomic conditions may influence cash levels by affecting the cost of holding cash or influencing investment opportunities and uncertainty (Graham and Leary 2018; Deloof et al. 2020; Chang et al. 2024; Das et al. 2024). Thus, we also include GDP Growth, obtained in the World Bank Data and defined as the annual percentage growth rate of each country's GDP, as an additional control variable.

3.3 Final regression model

In addition to the aforementioned variables, we add country, industry, and year fixed effects in our regression model. We opt to include industry and year dummies to control for industry-specific factors and any macroeconomic events (Dittmar and Mahrt-Smith 2007). Moreover, we add country-fixed effects to ensure that we measure within-country differences between public and private firms and control for unobserved time-invariant country effects (Mortal et al. 2020).

Thus, to test our research hypothesis, we estimate the following panel regression model (Eq. 1) using OLS estimation:

$$\begin{aligned} Cash_{it} = {} & \beta_0 + \beta_1 \, Listed\ Companies_{i,t} + \beta_2 \, Size_{i,t} + \beta_3 \, Dividend\ dummy_{i,t} \\ & + \beta_4 \, Cash\ \ Flow_{i,t} + \beta_5 \, Net\ Working\ Capital_{i,t} + \beta_6 \, Growth\ Opportunities_{i,t} \\ & + \beta_7 \, STD_{i,t} + \beta_8 \, Leverage_{i,t} + \beta_9 \, ROA_{i,t} + \beta_{10} \, \mathrm{Tang}ibility_{i,t} + \beta_{11} Age_{i,t} \\ & + \beta_{12} \, Investor\ \mathrm{Pr}otection_{i,t} + \beta_{13} \, WGI_{i,t} + \beta_{14} \, GDP_{i,t} + Country \\ & + \ Year\ + Industry + u_{i,t} \end{aligned} \tag{1}$$

As mentioned earlier, the variable of interest is the public company indicator (*Listed Companies*). The details of the construction of the variables are shown in Table 1.

4 Results

4.1 Descriptive statistics and correlations

Table 2 presents the descriptive statistics of the variables used in this study, covering the sample period from 2000 to 2019. Panel A first outlines the means for each of the six countries, as well as for the entire sample, which consists of 46,040 firm-year observations. Panel B of Table 2 subsequently presents both the mean and median values of the variables, along with the *T*-test and the Wilcoxon rank-sum (Mann–Whitney) test, which assess the differences in means and medians between public and private firms (matched private companies). Additionally, Panel B includes summary statistics for the matched sample of private companies. In this process, each Latin American public company in our sample is matched with a private firm from the same country and industry, with the closest firm size,

Table 2 Descriptive statistics

Panel A

Variables	Argentina	Brazil	Chile	Colombia	Mexico	Peru	Full Sample
Cash/Total Assets	0.0443	0.0536	0.0394	0.0401	0.0666	0.0509	0.0519
Listed Companies	0.3550	0.0723	0.3602	0.5578	0.5836	0.5489	0.1829
Size	4.7842	3.9360	4.8171	5.5701	6.5847	4.7169	4.3056
Dividend dummy	0.3714	0.3848	0.5465	0.5473	0.4163	0.4703	0.4119
Cash Flow	0.0778	0.0525	0.0771	0.0624	0.0763	0.0892	0.0599
Net Working Capital	0.0742	0.0888	0.7469	0.0357	0.0588	0.0516	0.0817
Growth Opportunities	32.3899	13.0387	10.8948	13.9630	11.8783	10.4916	13.5471
Short-Term Debt	0.03584	0.0476	0.0429	0.0130	0.0319	0.0643	0.0457
Leverage	0.2498	0.2085	0.2862	0.1884	0.2881	0.2366	0.2247
Return on Assets	0.0864	0.0651	0.0528	0.0772	0.0785	0.0908	0.0672
Tangibility	0.3516	0.3191	0.4251	0.4697	0.4317	0.5011	0.3517
Age	4.4255	3.3339	3.6384	4.1542	4.0131	3.9269	3.5079
Investor Protection	4.0000	3.0000	5.0000	3.0000	1.0000	3.0000	3.1490
WGI	−0.2183	0.1338	0.9422	−0.3081	−0.2190	−0.2047	0.1574
GDP	1.9778	0.6715	3.6628	3.8431	2.1062	4.8900	1.4318
Observations (*n*)	2,194	32,684	5,046	1,045	2,702	2,379	46,040

Panel B

Variables	Public companies (1)			Private firms (2)			Matched private companies (3)		
	Me Public Companies (1)an	Median	Stand. Dev	Mean	Median	Stand. Dev	Mean	Median	Stand. Dev
Cash/Total Assets	0.0640***	0.0385'''	0.0682	0.0492	0.0269	0.0558	0.0454***	0.0274'''	0.0489
Size	5.9632***	6.0221'''	1.9330	3.9459	3.8914	2.1321	5.9902	6.0677	1.8732
Dividend dummy	0.6248***	1.0000'''	0.4841	0.3642	0.0000	0.4812	0.4550***	0.0000'''	0.4980
Cash Flow	0.0781***	0.0720'''	0.1215	0.0558	0.0416	0.1542	0.0778	0.0644'''	0.1173
Net Working Capital	0.0778*	0.0580'''	0.1915	0.0825	0.0382	0.2453	0.0475***	0.0243'''	0.2040
Growth Opportunities	14.7718**	8.7904'''	40.8326	13.2728	1.8589	50.9408	16.0121*	7.8512'''	44.8575
Short-Term Debt	0.0282***	0.0000'''	0.0631	0.0496	0.0000	0.0958	0.0469***	0.0004	0.0918
Leverage	0.2546***	0.2448'''	0.1863	0.2179	0.1504	0.2281	0.3000***	0.2872'''	0.2192
Return on Assets	0.0749***	0.0658'''	0.1159	0.0655	0.0516	0.1565	0.0767	0.0635	0.1115
Tangibility	0.4169***	0.4165'''	0.2487	0.3371	0.2857	0.2870	0.4140	0.4211	0.2634
Age	4.1043***	4.0430'''	1.2941	3.3743	3.4019	1.3033	3.7297***	3.6375'''	1.6225
Observations (*n*)	8,421		37,619	8,421					

Provides the descriptive statistics of the variables used in this paper. Our sample consists of 7,222 Latin American firms (46,040 firm-year observations) from the six largest Latin American economies (Argentina, Brazil, Chile, Colombia, Mexico, and Peru) from 2000 to 2019. The definitions of the variables are provided in Table 1. Panel A of Table 2 provides the number of observations and means of the firm- and country-level variables for the Latin American countries. Panel B subsequently presents both the mean and

Table 2 (continued)

median values of the variables, along with the *T*-test and Wilcoxon rank-sum (Mann–Whitney) test, which assess the differences in means and medians between public and private firms (matched private companies). Additionally, Panel B includes summary statistics for the matched sample of private companies. In this process, each Latin American public company in our sample is matched with a private firm from the same country and industry, with the closest firm size, as measured by net assets. For more details on this matching procedure, please refer to the Robustness Checks (Sect. 4.3). In Column 1 of Panel B of Table 2, ***, **, and * (’’’, '', and ′) indicate significance levels of 1%, 5%, and 10% for the *T*-test (Wilcoxon Test) assessing whether public and private firms have equal means (medians). In Column 3 of Panel B of Table 2, ***, **, and * (’’’, '', and ′) indicate significance levels of 1%, 5%, and 10% for the *T*-test (Wilcoxon Test) assessing whether public and matched private companies have equal means (medians)

as measured by net assets. For more details on this matching procedure, please refer to the Robustness Checks (Sect. 4.3).

The results reported in Panel A of Table 2 indicate that cash holdings represent, on average, 5.19% of total assets for the whole sample of Latin American firms. The average ranges from 3.94% in Peru to 6.66% in Mexico. Comparing with the findings of Opler et al. (1999), which find an average value of 17% in the U.S. setting, we show that Latin American companies keep significantly lower cash holdings than publicly traded U.S. firms.

The sample consists of 18.29% public companies. Mexico, at 58.36%, has the highest percentage of public companies relative to private firms, followed by Colombia at 55.78%, Peru at 54.89%, Chile at 36.02%, Argentina at 35.50%, and Brazil at 7.23%. As previously mentioned, the natural logarithm of net assets and firm age serve as our measures of firm size and age, respectively. Among the Latin American countries, Mexico has the highest mean size at 6.58, while Brazil has the lowest at 3.93. In terms of firm age, Argentine companies are the oldest, whereas Brazilian firms are the youngest.

Additionally, 41.19% of firms pay dividends. The mean ratio of cash flow to net assets is positive for all the countries in our sample, with an overall mean of 5.99%. Brazil has the lowest mean cash flow of 5.25%, and Peru has the highest, with 8.92%. Net working capital investment, a potentially relevant alternative source of cash holdings, is, on average, 8.17% of net assets. Further, the mean annual sales growth, as a proxy of growth opportunities, is 13.54%. Companies from Argentina have the highest mean of sales growth, with 32.38%, while Peruvian companies have the lowest mean, with 10.49%. The mean short-term debt to net assets is 4.57%, while the mean leverage value is 22.47%. Furthermore, the average firm in the sample has an average ROA of 6.72%. Finally, the amount of property, plant, and equipment as a percentage of net assets for the full sample is 35.17%.

In terms of country-level institutional controls, Chile has the highest investor protections, as indicated by an Anti-Director Rights Index score of 5, while Mexico has the lowest score of 1. Furthermore, Chile ranks significantly higher than other Latin American economies on the WGI index, followed by Brazil, Peru, Argentina, Mexico, and Colombia. Lastly, Peru experienced the highest GDP growth at 4.89%, whereas Brazil had the lowest growth rate at 0.67%.

Turning to Panel B of Table 2, we first see that Latin American public companies hold significantly more cash and cash equivalents than their private counterparts: publicly traded companies hold on average 6.40% of their total assets in cash and cash equivalents, while private firms hold an average value of 4.92%. This difference is statistically significant at the 1% level and is consistent with the research hypothesis. Similarly, the Wilcoxon test indicates that the median cash holdings of public companies are significantly higher than those of private firms. Therefore, the results of the summary

statistics provide some initial support for the research hypothesis, i.e., Latin American private firms maintain a lower proportion of their assets in cash and cash equivalents than do their publicly traded counterparts. In terms of the standard deviation, Latin American public companies have a higher value (6.82%) compared with their private counterparts (5.58%).

Panel B of Table 2 also shows that Latin American public companies differ from their private counterparts in some important dimensions. The *T*-test results suggest significant differences, at least at the 10% level for all variables. For example, the data indicates that 62.48% of public companies, compared to 36.42% of private firms, distribute dividends, implying a higher likelihood of dividend payments among Latin American public firms. Additionally, public companies have higher sales growth, which is used as a proxy for growth opportunities. This suggests that public firms in Latin America have greater growth opportunities than their private counterparts. Univariate tests also indicate that Latin American public companies have higher cash flows to net assets and have more tangible assets than private firms. Moreover, the results reported in Panel B of Table 2 show that Latin American public companies are, on average, larger, older, more profitable, and more leveraged in relation to privately held firms. Conversely, Latin American private firms exhibit higher levels of net working capital and rely more heavily on short-term debt.

Continuing with Panel B of Table 2, the comparison of mean and median tests between public companies and matched private companies reveals that these entities exhibit comparable characteristics in terms of size—attributable to the matching procedure designed to pair firms of similar dimensions—as well as in cash flow, profitability (measured by ROA), and asset tangibility. Furthermore, the matched sample of private companies demonstrates enhanced investment opportunities and a higher level of leverage, along with a notable reduction in net working capital relative to publicly traded firms. Additionally, the average cash-to-assets ratio for Latin American private firms declined from 4.92% to 4.54% within the matched sample. The results from the matched private companies sample consistently indicate that Latin American public companies maintain significantly higher levels of cash and cash equivalents compared to their matched private counterparts. Other findings are consistent with those obtained from the mean and median tests comparing public companies to the full sample of privately held firms.

In sequence, Fig. 1 depicts the evolution of the average proportion of total assets invested in cash and cash equivalents over the period 2000–2019 for the entire sample and for public and private firms.

Observing Fig. 1, we see that the average cash holdings for the full sample represent about 3.87% of total assets in 2000 compared to 5.85% in 2019. We also observe that Latin American public companies hold higher cash levels than their private counterparts for every year in the sample period. Hence, Fig. 1 confirms that Latin American public companies maintain higher cash levels than non-public firms in the sample period from 2000 to 2019. For Latin American public companies, the average cash ratio increased from 3.88% in 2000 to 6.85% in 2019. For Latin American private firms, the average cash ratio increased from 3.87% in 2000 to 5.65% in 2019.

Next, Table 3 reports pairwise Pearson correlation coefficients between the variables used in this article. We also display in Table 3 the results of the variance inflation factor (VIF) test.

None of the correlations are high enough to present collinearity problems since all VIF values are below the threshold indicator of 10. Therefore, none of the variables should be dropped from our regression model.

4.2 Cash holdings regressions

In this subsection, we test whether Latin American private firms maintain lower or higher cash levels than their public counterparts using regression analysis. More precisely, in column 1 of Table 4, we analyze Eq. 1 for the whole sample of Latin American firms. In columns 2 and 3, we study the determinants of cash holdings in private and public companies separately. Our main interest variable is the *ListedCompanies* dummy variable that takes the value of 1 for Latin American public firms and 0 for their private counterparts. We remove the *ListedCompanies* dummy variable when we estimate Eq. 1 separately for private and public firms. The dependent variable ($Cash_{i,t}$) is the natural logarithm of the ratio of cash and cash equivalents to net assets. To conserve space, we do not tabulate the coefficients on the industry, country, and year dummies in this and subsequent tables. Robust standard errors clustered at the firm level are in parentheses.

Table 4 presents the OLS results with country, industry, and year fixed effects.

The results displayed in Table 4 confirm the univariate findings from Table 4. Specifically, the results of Table 4 show a positive and significant coefficient on the public firm indicator variable, indicating that Latin American public companies hold significantly higher cash holdings. Therefore, we continue to find that public firms from Latin America hold more cash than their private counterparts when controlling for other determinants of cash levels. Overall, the above evidence supports our research hypothesis that predicts that private firms retain significantly less cash holdings. Hence, even though privately held firms arguably face higher financial constraints and would be expected to have a higher precautionary demand for cash holdings, we demonstrate that Latin American privately held firms hold fewer corporate cash holdings relative to their public peers.

Regarding the control variables, we observe that more profitable firms and those with higher cash flows maintain higher cash holdings. Furthermore, the estimated coefficient on sales growth is positive and significant at the 1% level, suggesting that Latin American

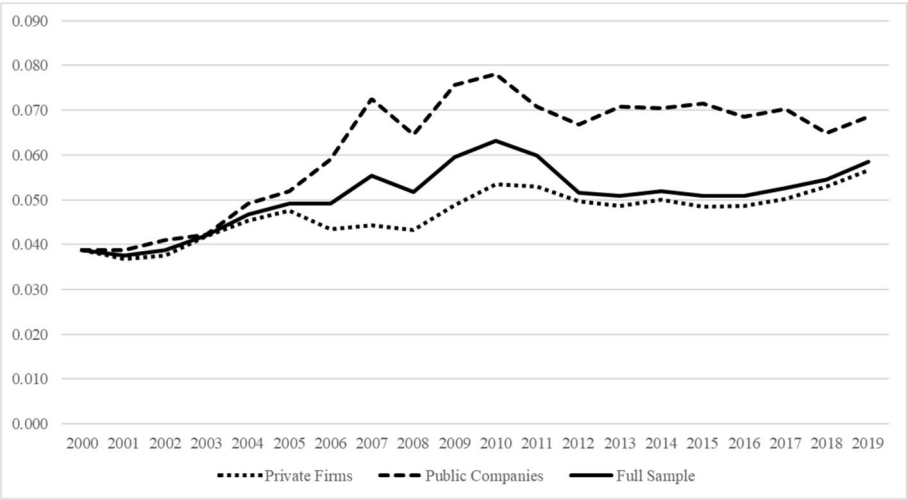

Fig. 1 Annual trend in mean cash ratio. *Notes* This Figure depicts the evolution of the average proportion of total assets invested in cash and cash equivalents (Cash and Cash Equivalents/Total Assets) across the sample period of 2000 to 2019 for the full sample, public company sample, and private firm sample

Table 3 Pearson correlation coefficients and variance inflation factor test

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	VIF
(1) Cash	1.000															–
(2) Listed Companies	0.118	1.000														1.250
(3) Size	0.123	0.350	1.000													1.480
(4) Dividend dummy	0.191	0.205	0.259	1.000												1.270
(5) Cash Flow	0.167	0.058	0.133	0.297	1.000											1.510
(6) Net Working Capital	0.000	−0.008	−0.171	0.102	−0.066	1.000										1.310
(7) Growth Opportunities	0.036	0.012	0.038	−0.017	0.004	−0.024	1.000									1.020
(8) Short-Term Debt	0.020	−0.091	−0.053	−0.037	−0.072	−0.169	−0.009	1.000								1.230
(9) Leverage	0.122	0.064	0.339	0.003	0.007	−0.296	0.035	0.355	1.000							1.430
(10) ROA	0.174	0.024	0.074	0.298	0.530	0.114	0.083	−0.021	−0.002	1.000						1.510
(11) Tangibility	0.006	0.109	0.102	−0.002	0.110	−0.332	0.016	−0.028	0.103	−0.029	1.000					1.170
(12) Age	0.052	0.212	0.168	0.145	0.065	0.043	−0.070	−0.012	−0.023	0.027	0.090	1.000				1.110
(13) Investor Protection	−0.088	0.000	−0.071	0.066	0.022	0.004	0.012	0.007	0.039	−0.028	0.028	0.011	1.000			2.210
(14) WGI	−0.076	−0.030	−0.011	0.076	0.004	0.006	−0.023	0.002	0.069	−0.039	0.025	−0.071	0.730	1.000		2.240
(15) GDP	0.027	0.238	0.181	0.086	0.052	−0.023	0.023	−0.014	0.068	0.063	0.104	0.101	0.169	0.186	1.000	1.130

Reports Pearson correlation coefficients and the VIF test for the variables used in this paper. Variable definitions are reported in Table 1

Table 4 OLS estimation explaining the determinants of cash holdings

Variables	Full sample (1) Coefficient	Private firms (2) Coefficient	Public companies (3) Coefficient
Constant	−4.808*** (0.103)	−5.067*** (0.140)	−3.341*** (0.141)
Listed Companies	0.421*** (0.027)	–	–
Size	0.005 (0.005)	0.004 (0.005)	−0.027*** (0.010)
Dividend dummy	0.533*** (0.020)	0.544*** (0.023)	0.437*** (0.036)
Cash Flow	1.090*** (0.071)	1.009*** (0.078)	1.532*** (0.174)
Net Working Capital	0.146*** (0.042)	0.175*** (0.046)	−0.163* (0.092)
Growth Opportunities	0.001*** (0.000)	0.001*** (0.001)	0.002*** (0.000)
Short-Term Debt	−0.014 (0.105)	0.141 (0.117)	−1.102*** (0.262)
Leverage	1.162*** (0.047)	1.140*** (0.053)	0.894*** (0.096)
Return on Assets	0.982*** (0.070)	0.952*** (0.077)	1.276*** (0.184)
Tangibility	0.044 (0.034)	0.176*** (0.038)	−0.705*** (0.074)
Age	0.034*** (0.007)	0.036*** (0.008)	0.017 (0.012)
Investor Protection	−0.289*** (0.028)	−0.091** (0.044)	−0.414*** (0.030)
WGI	−0.634*** (0.128)	−0.484*** (0.183)	−0.659*** (0.151)
GDP	0.035*** (0.006)	0.042*** (0.009)	0.003 (0.008)
Observations	46,040	37,619	8,421
p value	< 0.001	< 0.001	< 0.001
Country effects	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes
Year effects	Yes	Yes	Yes
Adjusted R^2	0.102	0.081	0.227

Reports OLS estimation explaining the determinants of cash holdings in Latin America. The dependent variable is the natural logarithm of the ratio of cash and cash equivalents to net assets. The definitions of the other variables are provided in Table 1. Robust standard errors clustered at the firm level are in parentheses.

*, **, *** indicate the significance levels at 10%, 5% and 1% respectively

firms with better investment opportunities maintain higher cash levels. This result is consistent with the argument that firms with more attractive growth opportunities tend to hold large amounts of cash in order not to be obliged to pass up profitable investment opportunities because they are short of cash resources.

The result of the dividend dummy variable indicates that firms that pay dividends hold more cash holdings. This evidence, on the other hand, is contrary to the findings of Opler et al. (1999), which show that firms that pay dividends accumulate less cash reserves. It is relevant to mention, however, that those dividend-paying companies can also hold more cash than non-dividend-paying firms to avoid a situation in which they are short of cash holdings to support their dividend policies (Ozkan and Ozkan 2004). Another issue that should be mentioned is the fact that corporate law in Brazil requires all profitable Brazilian public companies[5] to include in their Bylaws a percentage of annual profits, usually 25%, to be paid out as dividends. Therefore, it is not so simple for profitable Brazilian public companies to cut dividends to raise more funds (Manoel et al. 2024). Hence, the mandatory dividend rules in Brazil may have impacted, at least in part, the relationship between cash holdings and dividends in our paper.

Proceeding with the analysis presented in Table 4, we find that leverage has a positive and statistically significant effect on cash levels. Such a finding aligns with the argument of Ozkan and Ozkan (2004), which suggests that companies with higher leverage face a greater likelihood of financial distress. Notably, the coefficient for firm age is positive and statistically significant at the 5% level, indicating that older firms in Latin America hold more cash. This result contradicts the prediction made by Mortal et al. (2020), who argue that more mature companies tend to require fewer cash holdings. Furthermore, contrary to the expected negative relationship between NWC and cash levels, column 1 of Table 4 reveals a positive and statistically significant coefficient for NWC at the 1% level. In contrast, the size, short-term debt, and asset tangibility coefficients do not achieve statistical significance at conventional levels.

Regarding the results of the country-level control variables, we find that the coefficient on shareholders' rights, as measured by the anti-director rights index, is negative and statistically significant at the 1% level. This evidence is consistent with the findings of Dittmar et al. (2003) and suggests that Latin American firms with better investor protections stockpile lower cash holdings. Using cross-country data for 1998 from a sample of 45 countries, Dittmar et al. (2003) find that firms operating in countries characterized by weak investor protection hold more cash than those operating in nations with strong investor protection. Dittmar et al. (2003) attribute their evidence to the agency cost hypothesis: companies maintain higher cash reserves when they can do so. Therefore, the evidence of this paper suggests that shareholders' rights and agency costs are relevant in determining cash holdings in Latin America.

Moreover, there is a negative and significant relationship between the WGI index and cash reserves. This means that corporate cash holdings are higher when country-level governance is weak. Therefore, the worse the country's governance quality, the higher the level of cash reserves. Finally, the coefficient on the GDP growth has a significant positive coefficient. This result indicates that firms from high-growth countries maintain higher cash levels to avoid missing profitable growth opportunities.

Having established that the results are consistent with the research hypothesis, we can now explore whether the determinants of corporate cash holdings are the same for private and public companies in Latin America. In this sense, in columns 2 and 3 of Table 4, we separately provide the regression results for private and public firms. Interestingly, the results suggest that net working capital is positively related to cash holdings for private firms, which does not support the argument that NWC is a substitute for cash holdings. On the other hand, public companies' net working capital is negatively associated with cash, as predicted. We also find

[5] Chile and Colombia also require their companies to pay a certain fraction of income as dividends.

that short-term debt is only statistically significant for public companies with a negative sign. Firms' age, in turn, is only statistically significant, with a positive sign for private firms.

Furthermore, we now see that tangibility is a relevant determinant of cash levels for both public and private firms. However, it is relevant to observe that the coefficient is statistically significant, with a positive sign for private firms and a negative sign for public companies. This is because companies that should have greater access to the capital markets, as those that have greater asset tangibility, are expected to hold proportionally less cash. Therefore, the negative and statistically significant coefficient on tangibility for public companies is consistent with the precautionary motive for stockpiling cash holdings. Private firms, on the other hand, often have less access to the capital markets and, consequently, present a positive and statistically significant coefficient for tangibility.

Table 4 also shows a negative relationship between investor protections (shareholder rights) and cash levels in both public and private companies. Following Dittmar et al. (2003), we interpret this as indicating that shareholder rights and agency costs influence cash holdings. While agency theory suggests that public company managers hoard cash inefficiently due to agency conflicts, as demonstrated by Gao et al. (2013) in the U.S., our findings in the Latin American context reveal a key difference. Although shareholder rights are negatively related to cash holdings in both firm types, the effect is not large enough to suggest that public firms in Latin America hold significantly more cash due to greater agency conflicts.

Finally, we observe that the coefficients of GDP growth are positive but only statistically significant for private firms. The other results are qualitatively similar to those reported in column 1 of Table 4.

4.3 Robustness tests

In this subsection, we conduct several additional tests to examine the robustness of our findings.

4.3.1 An alternative measure of cash reserves

In all the analyses made above, we use the natural logarithm of the ratio of cash and cash equivalents to net assets as a measure of cash holdings. Thus, as our first robustness check, we also consider an alternative measure of cash. Following Ozkan and Ozkan (2004), Harford et al. (2008), Bates et al. (2009), Hall et al. (2014) and Manoel and Moraes (2022a), we employ the ratio of cash and cash equivalents over total assets as our new dependent variable. No other variables are redefined. Table 5 presents the new results.

The coefficient on the public firm indicator variable is 0.018 and is statistically significant at the 1% level. Therefore, Table 5 shows that our main conclusions are robust to using an alternative measure of cash holdings. Additionally, the estimated coefficients on size are now negative and statistically significant at the 1% level for the full sample and for both private and public firms, which is consistent with economies of scale in cash management. We also observe in Table 5 that the coefficients on NWC are now statistically significant with a negative sign for the entire sample and for both public and private firms. This new result is consistent with the argument that firms can use other liquid assets when they have shortfalls in cash holdings (Opler et al. 1999).

Additionally, the coefficients on short-term debt (β_7) are now negative and statistically significant for the full sample and for both public and private companies. According to Almeida et al. (2004), a negative association between short-term debt and cash

Table 5 OLS estimation explaining the determinants of cash holdings with an alternative measure of cash holdings

Variables	Full sample (1) Coefficient	Private firms (2) Coefficient	Public companies (3) Coefficient
Constant	0.045*** (0.003)	0.035*** (0.004)	0.123*** (0.006)
Listed Companies	0.018*** (0.001)	–	–
Size	−0.001*** (0.000)	−0.001*** (0.000)	−0.006*** (0.000)
Dividend dummy	0.013*** (0.001)	0.013*** (0.001)	0.012*** (0.002)
Cash Flow	0.043*** (0.002)	0.038*** (0.002)	0.067*** (0.008)
Net Working Capital	−0.012*** (0.001)	−0.008*** (0.001)	−0.047*** (0.004)
Growth Opportunities	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
Short-Term Debt	−0.037*** (0.003)	−0.029*** (0.003)	−0.075*** (0.012)
Leverage	0.021*** (0.001)	0.018*** (0.001)	0.021*** (0.004)
Return on Assets	0.036*** (0.002)	0.031*** (0.002)	0.088*** (0.008)
Tangibility	−0.010*** (0.001)	−0.005*** (0.001)	−0.040*** (0.003)
Age	0.001*** (0.000)	0.001** (0.000)	0.000 (0.001)
Investor Protection	−0.010*** (0.001)	−0.003*** (0.001)	−0.017*** (0.001)
WGI	−0.011*** (0.004)	−0.006 (0.005)	−0.007 (0.007)
GDP	0.001*** (0.000)	0.001*** (0.000)	0.000 (0.000)
Observations	46,040	37,619	8,421
p value	<0.001	<0.001	<0.001
Country effects	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes
Year effects	Yes	Yes	Yes
Adjusted R^2	0.093	0.069	0.211

Reports the OLS estimation, explaining the determinants of cash holdings in Latin America with an alternative measure of cash holdings. The dependent variable is the ratio of cash and cash equivalents to total assets. The definitions of the other variables are provided in Table 1. Robust standard errors clustered at the firm level are inparentheses.

*, **, *** indicate the significance levels at 10%, 5% and 1% respectively

levels is due to the fact that firms can build cash levels by increasing their short-term debt levels. Another interesting result in Table 5 is that the coefficients on tangibility are negatively related to cash levels when we use the ratio of cash and cash equivalents to

total assets as our dependent variable. At the same time, they are positive for the whole sample and for private firms when we use the natural logarithm of the ratio of cash and cash equivalents to net assets as a measure of cash. Therefore, the evidence in Table 5 for the variable tangibility is consistent with the argument that companies can sell part of their tangible assets when they need cash balances. Furthermore, the coefficients on the WGI index lose their previous significance for both public and private companies. The signs and the significance of the other coefficients are generally similar to those reported in Table 4, but the Adjusted R^2s are slightly lower.

4.3.2 Robustness to country representation and the weighted least squares methodology

Within our Latin American sample, the distribution of companies varies significantly, with Brazil accounting for a substantial proportion. Indeed, Brazil's presence looms large in our analyses, representing 70.97% of all firm-year observations. One question that emerges from our research is whether a single country (Brazil) may be driving our results. To address this concern, we first reestimate Eq. 1 without Brazilian firms to assess whether Brazil drives our results. As in Eq. 1, the left-hand-side variable is the natural logarithm of the cash and cash equivalents ratio to net assets. Standard error estimates are clustered by firm level, and the regression specifications also include country, industry, and year fixed effects. The results reported in Panel A of Table 6 suggest that our main findings are the same when we remove Brazilian firms from the sample.[6]

Furthermore, one approach to deal with the concern that Brazil is driving our conclusions is to estimate a weighted least-squares regression. In the WLS approach, every country has an equal weight irrespective of the number of firms it has (Fernandes and Gonenc 2016; Pinkowitz et al. 2016; Manoel and Moraes 2022b). Thus, as a further step, we estimate Eq. 1 using the WLS methodology with weights equal to the inverse of the number of firm-year observations in each country. Panel B of Table 6 reports the results. From the results in Panel B of Table 6, we demonstrate that our main conclusions did not suffer any significant change. In fact, the results obtained with the weighted least squares methodology complement our earlier findings: Latin American private firms hold significantly less cash holdings than their public counterparts. We conclude, thereby, that our results are not driven by the bigger representation of Brazil in our sample.

4.3.3 Firm fixed effects estimation and alternative regression specifications

In our primary analyses, we employ pooled OLS regressions, incorporating country, industry, and year fixed effects. However, the decision to transition to a public company is not a random occurrence but a deliberate corporate choice. Consequently, studies involving both public and private firms are susceptible to endogeneity concerns (Chemmanur et al. 2010; Gao et al. 2013; Drobetz et al. 2019). This issue is particularly pertinent in the empirical examination of corporate cash holdings, as noted by Ozkan and Ozkan (2004). Given the non-random nature of this decision-making process, the OLS regression approach may not

[6] Unreported results in the interest of brevity also indicate that our main findings are the same when we exclude each country, one at a time, from our sample.

Table 6 OLS (without Brazilian companies) and WLS estimations explaining the determinants of cash holdings

Panel A				Panel B			
Variables	Full sample (1)	Private firms (2)	Public companies (3)	Variables	Full sample (1)	Private firms (2)	Public companies (3)
	Coefficient	Coefficient	Coefficient		Coefficient	Coefficient	Coefficient
Constant	−3.543***	−3.927***	−3.072***	Constant	−4.303***	−4.835***	−3.030***
	(0.112)	(0.165)	(0.149)		(0.187)	(0.227)	(0.369)
Listed Companies	0.211***	–	–	Listed Companies	0.246***	–	–
	(0.028)				(0.064)		
Size	0.002	−0.012	−0.002	Size	0.020	0.012	0.005
	(0.007)	(0.010)	(0.011)		(0.012)	(0.013)	(0.030)
Dividend dummy	0.400***	0.451***	0.305***	Dividend dummy	0.506***	0.540***	0.390***
	(0.030)	(0.043)	(0.039)		(0.038)	(0.039)	(0.078)
Cash Flow	1.228***	1.030***	1.740***	Cash Flow	1.332***	1.106***	1.975***
	(0.131)	(0.170)	(0.207)		(0.128)	(0.122)	(0.428)
Net Working Capital	−0.387**	−0.502***	−0.241**	Net Working Capital	0.081	0.102	−0.097
	(0.074)	(0.100)	(0.108)		(0.101)	(0.104)	(0.248)
Growth Opportunities	0.001	−0.001	–	Growth Opportunities	0.001***	0.001***	0.002***
	(0.001)	(0.001)			(0.000)	(0.000)	(0.001)
Short-Term Debt	−0.382**	−0.178	−1.079***	Short−Term Debt	−0.206	0.012	−1.121**
	(0.173)	(0.223)	(0.276)		(0.196)	(0.202)	(0.516)
Leverage	0.066	−0.033	0.363***	Leverage	0.903***	0.886***	0.713***
	(0.072)	(0.094)	(0.116)		(0.112)	(0.121)	(0.259)
Return on Assets	0.911***	0.611***	1.059***	Return on Assets	1.138***	0.970***	1.605***
	(0.139)	(0.185)	(0.211)		(0.137)	(0.136)	(0.393)
Tangibility	−0.767***	−0.595***	−0.972***	Tangibility	−0.167*	0.098	−0.921***
	(0.056)	(0.076)	(0.082)		(0.086)	(0.086)	(0.213)
Age	−0.013	−0.043***	0.030**	Age	0.009	0.015	0.006
	(0.008)	(0.011)	(0.013)		(0.017)	(0.018)	(0.033)
Investor Protection	−0.266***	−0.107***	−0.378***	Investor Protection	−0.295***	−0.108	−0.369***
	(0.024)	(0.039)	(0.030)		(0.050)	(0.075)	(0.063)

Table 6 (continued)

Panel A				Panel B			
Variables	Full sample (1)	Private firms (2)	Public companies (3)	Variables	Full sample (1)	Private firms (2)	Public companies (3)
	Coefficient	Coefficient	Coefficient		Coefficient	Coefficient	Coefficient
WGI	−1.018***	−1.085***	−0.656***	WGI	−0.452**	−0.130	−0.417
	(0.131)	(0.199)	(0.163)		(0.194)	(0.285)	(0.266)
GDP	0.001	0.007	−0.009	GDP	0.040***	0.051***	−0.008
	(0.006)	(0.009)	(0.009)		(0.008)	(0.013)	(0.012)
Observations	13,356	7,300	6,057	Observations	43,846	36,204	7,642
p value	< 0.001	< 0.001	< 0.001	*p*−Value	< 0.001	< 0.001	< 0.001
Country effects	Yes	Yes	Yes	Country effects	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes	Industry effects	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Year effects	Yes	Yes	Yes
Adjusted R^2	0.184	0.157	0.259	Adjusted R^2	0.128	0.092	0.292

Reports OLS (Panel A) and WLS (Panel B) estimations, explaining the determinants of cash holdings. In Panel A, we remove Brazilian companies from the sample. The dependent variable is the natural logarithm of the ratio of cash and cash equivalents to net assets. The definitions of the other variables are provided in Table 1. Robust standard errors clustered at the firm level are in parentheses.

*, **, *** indicate the significance levels at 10%, 5% and 1% respectively

adequately address concerns related to self-selection bias and the omission of correlated variables.

To tackle these challenges, Kim et al. (2011) suggest using firm fixed effects because it allows researchers to mitigate some of the potential problems of correlated omitted variables by controlling for unobservable, time-invariant, and firm-specific characteristics. Furthermore, Mortal et al. (2020) indicate the use of firm fixed effects to exploit within-firm variation in listing status while controlling form time-invariant firm characteristics. In this sense, instead of using the OLS procedure, we now estimate Eq. 1 with firm fixed effects as another robustness check.[7] The results of the analysis are presented in Table 7.

The results displayed in Table 7 indicate that Latin American private firms hold significantly less cash holdings than their public peers. Therefore, even after controlling for firm fixed effects,[8] we continue to find evidence consistent with our research hypothesis. This robustness check mitigates but does not eliminate the concern that our main empirical findings may be driven by the endogeneity of variation in companies' listing status.

To further address potential endogeneity concerns, we conducted several additional robustness checks. Due to space limitations, we do not report them here, but they are available from the authors upon request. Initially, we reestimate our models by scaling both the dependent and independent variables by lagged net assets instead of net assets. This alternative scaling approach allowed us to investigate whether our conclusions are sensitive to the choice of scaling method, thereby enhancing the overall reliability of our results. The findings once again confirmed our earlier observations, indicating that Latin American public companies maintain significantly higher cash holdings than their private counterparts.

Subsequently, we lagged all explanatory variables by one period. This approach decreases the probability that the observed relationships result from the influence of cash holdings on firm-specific factors. Additionally, we included the lagged cash holdings as an explanatory variable in this specification to provide additional control for endogeneity (Chang et al. 2024). Untabulated results confirmed the stability of our main empirical findings in this adjusted specification.

Finally, we reestimate Eq. 1 using changes in the variables rather than their levels. Chung et al. (2015) suggest that regression analyses based on variable changes are typically less prone to spurious correlations compared to those utilizing level variables. Additionally, Bates et al. (2009) note that this approach mitigates the influence of time-invariant,

[7] Incorporating year fixed effects into this robustness test with firm fixed effects could account for macroeconomic shocks and overarching temporal trends. This approach aligns with the primary analysis, where, in addition to country and industry fixed effects, year fixed effects are incorporated in the OLS model. However, including year fixed effects in the firm fixed effect specification would likely absorb critical time-based variation related to IPO and delisting events, which are central to the analysis of the *ListedCompanies* dummy variable. We acknowledge, however, that excluding year fixed effects entails a trade-off. Broader economic shocks, such as the COVID-19 pandemic, may influence firm cash holdings and partially overlap with the temporal variation captured by the *ListedCompanies* dummy. However, the inclusion of year fixed effects in this estimation results in a loss of statistical significance for this key variable, suggesting that year effects primarily capture macroeconomic fluctuations rather than firm-specific attributes. While this finding justifies excluding year fixed effects to prioritize firm-level dynamics, we recognize that this approach limits the ability to explicitly account for external shocks that affect all enterprises in the sample.

[8] In addition to OLS and firm fixed effects specifications, we also estimate Eq. 1 using the generalized method of moments (GMM) to explicitly consider the endogeneity concern in the empirical research on cash management (Ozkan & Ozkan 2004; Brick & Liao 2017; Das et al. 2024). Untabulated results to preserve space show that our main results are qualitatively the same when we use the GMM specification. The GMM specification was performed using the 2-stage GMM estimator.

Table 7 Firm fixed effects estimation explaining the determinants of cash holdings

Variables	Full sample (1) Coefficient	Private firms (2) Coefficient	Public companies (3) Coefficient
Constant	−5.063*** (0.222)	−5.164*** (0.245)	−5.463*** (0.637)
Listed Companies	0.326*** (0.089)	–	–
Size	−0.130*** (0.022)	−0.177*** (0.025)	−0.036 (0.055)
Dividend dummy	0.167*** (0.025)	0.151*** (0.028)	0.174*** (0.056)
Cash Flow	0.799*** (0.077)	0.774*** (0.079)	1.006*** (0.279)
Net Working Capital	−0.507*** (0.089)	−0.458*** (0.093)	−0.665*** (0.245)
Growth Opportunities	0.001*** (0.000)	0.001*** (0.000)	0.001 (0.000)
Short-Term Debt	−0.736*** (0.133)	−0.456*** (0.137)	−2.497*** (0.418)
Leverage	0.670*** (0.097)	0.779*** (0.105)	0.347 (0.240)
Return on Assets	0.971*** (0.107)	0.822*** (0.111)	1.795*** (0.347)
Tangibility	0.009 (0.111)	0.067 (0.125)	−0.047 (0.258)
Age	0.385*** (0.064)	0.434*** (0.073)	0.507*** (0.154)
Investor Protection	–	–	–
WGI	0.207** (0.103)	0.506*** (0.120)	−0.566*** (0.203)
GDP	0.012*** (0.003)	0.016*** (0.003)	−0.005 (0.005)
Observations	46,040	37,619	8,421
p value	< 0.001	< 0.001	< 0.001
Country effects	No	No	No
Industry effects	No	No	No
Year effects	No	No	No
Adjusted R^2	0.016	0.006	0.021

Reports firm fixed effects estimation explaining the determinants of cash holdings in Latin America. The dependent variable is the natural logarithm of the ratio of cash and cash equivalents to net assets. The definitions of the other variables are provided in Table 1. Robust standard errors clustered at the firm level are in parentheses.

*, **, *** indicate the significance levels at 10%, 5% and 1% respectively

unobservable firm characteristics on cash holdings. In this specification, we also include both the lagged change in cash and the lagged level of cash as explanatory variables to account for the partial adjustment of the cash ratio toward its equilibrium level (Bates et al. 2009). Unreported findings indicate that the *ListedCompanies* dummy variable, which

takes the value of 1 for Latin American public firms and 0 for their private counterparts, is positively and significantly associated with changes in corporate cash holdings.

4.3.4 Propensity score matching approach

An initial public offering (IPO) constitutes a transformative event in a company's lifecycle, bearing substantial implications for its future development and strategic direction. Therefore, it is evident that the choice to transition into a public company is not made arbitrarily but is a strategic and carefully considered decision (Chemmanur et al. 2010; Gao et al. 2013; Drobetz et al. 2019). Consequently, the composition of our sample, encompassing both private and public enterprises from Latin America, is not determined randomly.

Thus, in addition to the aforementioned robustness checks, we also used the propensity score matching approach as a further endeavor to alleviate the concerns regarding self-selection bias, which represents one form of endogeneity (Chemmanur et al. 2010; Gao et al. 2013; Drobetz et al. 2019; Mortal et al. 2020; Eskandari and Zamanian 2022; Gogineni et al. 2022). Moreover, besides mitigating self-selection bias based on observable firm characteristics, the PSM technique also helps to address significant differences in sample size distribution between public and private groups, as well as disparities in sample firm distribution across industries (Chemmanur et al. 2010; Gao et al. 2013; Drobetz et al. 2019; Mortal et al. 2020; Eskandari and Zamanian 2022; Gogineni et al. 2022).

Following the approach of Mortal and Reisel (2013), Drobetz et al. (2019) and Mortal et al. (2020), we deliberately kept the matching criteria simple to facilitate comparisons between public and private companies across multiple characteristics. More precisely, we match each Latin American public company firm in our sample with a private firm in the same country, industry, and closest in size, computed by net assets. This matching procedure based on country and industry ensures that we compare public companies to privately held firms from the same country and industry. In Table 8, we present the results of our main specification using the combined sample of private and public companies (column 1), the matched sample of private companies (column 2), and the sample of public companies (column 3).

The results displayed in Table 8 indicate that our main results continue to hold when we use the propensity score matching procedure. More precisely, we observe that the coefficient on the public firm indicator in column 1 for the matched sample is 0.347 and is statistically significant at the 1% level. This evidence shows that Latin American private firms' cash holdings are significantly lower than their propensity score-matched public counterparts. Therefore, our main inferences are robust in both matched and unmatched samples. An exception in the results from Table 8 that should be noted is that the coefficient estimate on size is now only statistically significant with a negative sign for public companies and for the combination of the sample of private and public. For the matched private firms' sample, however, the coefficient of size becomes statistically insignificant, suggesting that the cash holdings of privately held firms in Latin America are less affected by firm size. The other evidence in Table 8 reveals that the determinants of cash savings are similar to private and public companies when we used the matched sample.

Table 8 OLS regressions explaining the determinants of cash holdings for the matched sample

Variables	Combination of the sample of private and public companies (1)	Matched private companies (2)	Public companies (3)
	Coefficient	Coefficient	Coefficient
Constant	−4.095*** (0.108)	−4.643*** (0.162)	−3.341*** (0.141)
Listed Companies	0.347*** (0.024)	–	–
Size	−0.018** (0.007)	0.002 (0.011)	−0.027*** (0.010)
Dividend dummy	0.564*** (0.026)	0.630*** (0.038)	0.437*** (0.036)
Cash Flow	1.268*** (0.127)	1.085*** (0.183)	1.532*** (0.174)
Net Working Capital	−0.215*** (0.068)	−0.250** (0.098)	−0.163* (0.092)
Growth Opportunities	0.001*** (0.000)	0.001 (0.000)	0.002*** (0.000)
Short-Term Debt	−0.814*** (0.159)	−0.691*** (0.204)	−1.102*** (0.262)
Leverage	0.893*** (0.064)	0.801*** (0.088)	0.894*** (0.096)
Return on Assets	1.345*** (0.135)	1.424*** (0.195)	1.276*** (0.184)
Tangibility	−0.507*** (0.053)	−0.218*** (0.075)	−0.705*** (0.074)
Age	0.011 (0.008)	0.007 (0.011)	0.017 (0.012)
Investor Protection	−0.318*** (0.023)	−0.164*** (0.036)	−0.414*** (0.030)
WGI	−0.633*** (0.116)	−0.486*** (0.176)	−0.659*** (0.151)
GDP	0.014** (0.006)	0.017* (0.009)	0.003 (0.008)
Observations	16,842	8,421	8,421
p value	< 0.001	< 0.001	< 0.001
Country effects	Yes	Yes	Yes
Industry effects	Yes	Yes	Yes
Year effects	Yes	Yes	Yes
Adjusted R^2	0.180	0.157	0.227

Presents the results of OLS regressions for the combined sample of private and public companies (column 1), the matched sample of private companies (column 2), andthe sample of public companies (column 3). Details of the matching procedure are provided in the text. The dependent variable is the natural logarithm of the ratio of cash and cash equivalents to net assets. The definitions of the other variables are provided in Table 1. Robust standard errors clustered at the firm level are in parentheses.

*, **, *** indicate the significance levels at 10%, 5% and 1% respectively

4.3.5 Heckman's (1979) two-step treatment effect model

Another aspect of concern is the potential impact of unobservable firm-level characteristics on companies' decisions to pursue public listing or maintain private ownership. Suppose our empirical model inadequately accounts for these factors. In that case, there is a risk of attributing our primary empirical findings erroneously to the decision to go public or remain privately owned rather than to the influence of a company's public or private status on cash balances. Therefore, for a precise examination of cash holdings and their determinants within private and public enterprises in Latin America and to ascertain whether privately held firms in the region maintain lower or higher cash reserves compared to their public counterparts, it is essential to disentangle the influence of a company's public or private status on cash balances from the endogeneity inherent in the decision to be either privately or publicly owned.

Therefore, in addition to employing the PSM technique to alleviate some of the self-selection bias stemming from observable firm characteristics, we also utilize Heckman's (1979) correction method as an additional robustness check to address self-selection influenced by unobservable factors. In the first step, we estimate a probit model using our entire sample, contrasting with the matched sample used in the PSM approach. The dependent variable in this model is the public dummy variable, which is assigned a value of 1 for Latin American public firms and 0 for their private counterparts. In the spirit of Brav (2009), Bharath and Dittmar (2010), Chemmanur et al. (2010), Mortal and Reisel (2013) and Drobetz et al. (2019), we include firm size, a dividend dummy, cash flow, net working capital, growth opportunities, leverage, a continuous measure of profitability (Return on Assets – ROA), tangibility, firm age, cash levels, and capital expenditure (Capex) in the first stage of Heckman's (1979) self-selection correction model.[9] All variables are as previously defined in Table 1, except for cash levels and Capex. Cash levels are defined as the ratio of cash and cash equivalents to net assets, while Capex is computed as the ratio of net capital expenditure (capital expenditure minus accumulated depreciation) to net assets.

The rationale behind including these variables lies in the empirical evidence provided by the aforementioned studies, suggesting their potential influence on a company's likelihood of pursuing a public listing. We also include country, industry and year fixed effects in the first-stage regression. Due to the additional data requirements, our full sample size is reduced from 46,040 firm-year observations to 43,436 firm-year observations in this robustness check.

In the second stage, we reestimate our baseline specification in Eq. 1 with the inverse Mills ratio (IMR), $\lambda_{i,t}$, obtained in the 1st-stage probit regression, included as an additional explanatory. Panel A of Table 9 displays the results from the first-stage probit regression, while Panel B provides the findings from the second stage of Heckman's (1979) two-step method.

The findings in Panel A of Table 9 indicate that larger firms, dividend-paying companies, those with higher levels of net working capital, firms experiencing significant growth opportunities (as indicated by sales growth), companies with a greater proportion of tangible assets, older enterprises, firms with higher ratios of cash and cash equivalents to net assets, and those with substantial capital expenditures relative to net assets exhibit a statistically significant positive propensity to pursue public listing. Conversely, the first-stage probit regression results reveal that firms with higher cash flows, increased leverage, and greater profitability are less inclined to transition into public enterprises.

Turning to Panel B, the results provide evidence of self-selection bias, as indicated by the statistically significant coefficients on the IMR, $\lambda_{i,t}$, at the 1% level. The statistically

[9] Unfortunately, our dataset lacks variables that can directly assess ownership structure across the entire sample. As a result, we cannot consider this factor in companies' decisions to go public or remain private.

Table 9 Heckman's (1979) self-selection correction model

Panel A: Probit estimation—first stage		Panel B: Second stage of Heckman's (1979) two-stage approach			
Variables	Full sample	Variables	Full sample (1)	Private firms (2)	Public companies (3)
	Coefficient		Coefficient	Coefficient	Coefficient
Constant	−1.512***	Constant	11.085***	13.120***	7.394***
	(0.076)		(0.113)	(0.141)	(0.169)
Size	0.250***	Listed Companies	0.228*** (0.019)	–	–
	(0.005)				
Dividend dummy	0.393***	Size	−1.251***	−1.450***	−0.828***
	(0.019)		(0.008)	(0.009)	(0.012)
Cash Flow	−0.222***	Dividend dummy	−1.688***	−2.042***	−1.149***
	(0.083)		(0.018)	(0.021)	(0.031)
Net Working Capital	0.304***	Cash Flow	1.279***	1.414***	1.441***
	(0.048)		(0.052)	(0.056)	(0.126)
Growth Opportunities	0.001**	Net Working Capital	−1.443***	−1.693***	−0.951***
	(0.000)		(0.032)	(0.035)	(0.068)
Leverage	−0.350***	Growth Opportunities	−0.002***	−0.002***	−0.001
	(0.044)		(0.000)	(0.000)	(0.000)
Return on Assets	−1.038***	Short−Term Debt	0.404***	0.413***	−0.555***
	(0.093)		(0.076)	(0.082)	(0.188)
Tangibility	0.121***	Leverage	2.256***	2.556***	1.632***
	(0.038)		(0.035)	(0.039)	(0.069)
Age	0.091***	Return on Assets	5.726***	6.351***	4.063***
	(0.006)		(0.058)	(0.063)	(0.137)
Cash Levels	2.939***	Tangibility	−0.417***	−0.433***	−0.689***
	(0.121)		(0.026)	(0.028)	(0.054)
Capex	0.110***	Age	−0.450***	−0.533***	−0.286***
	(0.032)		(0.006)	(0.007)	(0.010)
Observations	43,436	Investor Protection	−1.193***	−1.289***	−0.918***
p value	< 0.001		(0.020)	(0.031)	(0.022)
Country effects	Yes	WGI	−0.154*	−0.081	−0.530***
Industry effects	Yes		(0.091)	(0.127)	(0.107)
Year effects	Yes	GDP	−0.009**	0.003	−0.014**
Pseudo R^2	0.351		(0.004)	(0.006)	(0.006)
		$\lambda_{i,t}$	−6.305***	−7.046***	−5.444***
			(0.034)	(0.040)	(0.066)
		Observations	43,436	35,166	8,270
		p value	< 0.001	< 0.001	< 0.001
		Country effects	Yes	Yes	Yes

Table 9 (continued)

Panel A: Probit estimation—first stage		Panel B: Second stage of Heckman's (1979) two-stage approach			
Variables	Full sample	Variables	Full sample (1)	Private firms (2)	Public companies (3)
	Coefficient		Coefficient	Coefficient	Coefficient
		Industry effects	Yes	Yes	Yes
		Year effects	Yes	Yes	Yes
		Adjusted R^2	0.491	0.506	0.594

Panel A of Table 9 presents the results from the first-stage probit regression, while Panel B outlines the findings from the second stage of Heckman's (1979) two-step method. In the first-stage probit regression, the dependent variable is a public dummy variable, assigned a value of 1 for Latin American public firms and 0 for their private counterparts. The model includes firm size, a dividend dummy, cash flow, net working capital, growth opportunities, leverage, a continuous measure of profitability (Return on Assets – ROA), tangibility, firm age, cash levels, and capital expenditure. Except for cash levels, defined as cash and cash equivalents divided by net assets, and Capex, defined as the ratio of capital expenditure to net assets, all other variables are defined as previously in Table 1. In the second stage, we reestimate our baseline specification in Eq. 1, incorporating the inverse Mills ratio, $\lambda_{i,t}$, obtained from the first-stage probit regression, as an additional explanatory variable. The dependent variable in this second stage of Heckman's (1979) two-stage approach is the natural logarithm of the ratio of cash and cash equivalents to net assets. All other variables in the second stage are defined as previously in Table 1. Robust standard errors clustered at the firm level are in parentheses.

*, **, *** indicate the significance levels at 10%, 5% and 1% respectively

significant coefficients for this variable support the view that becoming a publicly traded company is not an exogenous event but an endogenous strategic decision influenced by various factors aligned with a firm's financing and investment strategies (e.g., Chemmanur et al. 2010; Gao et al. 2013; Drobetz et al. 2019). Despite the presence of self-selection behavior highlighted in Panel B of Table 9, our findings consistently suggest that publicly listed Latin American firms maintain significantly higher cash reserves compared to their privately held counterparts.

4.3.6 The 2007–2009 financial crisis

In sequence, we assess the sensitivity of our results to the 2007–2009 global financial crisis period (Chung et al. 2015). We do so because market imperfections are more severe in times of crisis when the supply of external funds becomes scarce, which leads to a higher demand for precautionary cash holdings (Acharya and Steffen 2020). Accordingly, it is interesting to examine the effects of the crisis on the cash levels of public and private firms. Following Manoel and Moraes (2022a), we split our sample period into three subperiods: before the crisis (2000–2006), during the crisis (2007–2009), and after the crisis (2010–2019). After splitting the sample period into three sub-periods, we reestimate Eq. 1. Unreported results to preserve space show that Latin American private firms hold significantly lower cash levels than their public counterparts in the three sub-periods.

Finally, a common concern in databases is that recent years generally have more information than older years. Thus, to control for this possible bias, we reestimate Eq. 1 after dividing our sample into two periods: from 2000 to 2010 and from 2011 to 2019. Unreported results to conserve space indicate that the coefficient on the public firm indicator variable continues to be significantly positive in all specifications. Therefore, our main

conclusions are unaltered when we split the sample period. In sum, the robustness checks presented in this subsection support our research hypothesis that Latin American public companies hold significantly higher cash holdings than their privately held counterparts.

5 The cash flow sensitivity of debt and cash for public and private firms in Latin America

The results in Sect. 4 leave the following open question: Why do precautionary reasons for holding cash not lead privately-held firms in Latin America to hold substantially more cash balances than their public counterparts? Aiming to answer this question, we examine the cash flow sensitivity of debt and cash for public and private firms in this section.

As noted earlier, a key benefit of being a publicly listed company is that it generally provides companies access to lower-cost external financing through the public markets. Thus, whereas managers in publicly traded companies can usually smooth their activities and invest when appropriate by accessing public equity markets, privately-held firm managers have to rely more on available internal resources (Brav 2009; Gogineni et al. 2012; Drobetz et al. 2019). In this sense, the first prediction regarding the cash flow sensitivity of debt is that privately held firms will use cash flow to pay off debt because they bear a higher cost of debt relative to their public peers (Mortal et al. 2020). Thus, we expect the cash flow sensitivity of debt to be negative and statistically significant for private firms. On the other hand, public companies should have no systematic relationship between changes in debt and cash flows.

In Almeida et al.'s (2004) cash flow sensitivity of the cash model, financially constrained companies save a positive fraction of their current cash flows on the balance sheet as cash holdings to increase their ability to finance both present and future growth opportunities. Unconstrained companies' cash holdings, on the other hand, are not systematically related to cash flows since their investments are already at the first-best levels. Hence, incremental internal cash flows do not influence unconstrained firms' investments. Consequently, the portion of cash and cash equivalents retained by a company from its cash flows reflects the management's view of whether the company will likely face financial constraints in the future (Almeida et al. 2004). Thus, regarding a firm's propensity to save cash out of cash inflows, which Almeida et al. (2004) refer to as the cash flow sensitivity of cash, we expect a positive association between cash flow and change in cash holdings for private firms, given that they are in theory more financially constrained. Publicly traded companies, in contrast, should display no such relationship.

We partitioned the sample into public and private firms to estimate the cash flow sensitivity of debt and cash. Then, in sequence, we estimate Eqs. 2 and 3, using three-stage least squares (3SLS) to test our arguments (Almeida et al. 2004; Mortal et al. 2020):

$$\begin{aligned}\Delta Debt_{i,t} = {} & \alpha_0 + \alpha_1 Cash\,Flow_{i,t} + \alpha_2 \Delta Cash_{i,t} + \alpha_3 Debt_{i,t-1} \\ & + \alpha_4 Size_{i,t} + \alpha_5 Growth\,Opportunities_{i,t} + \epsilon_{i,t}\end{aligned} \tag{2}$$

$$\begin{aligned}\Delta Cash_{i,t} = {} & \alpha_0 + \alpha_1 Cash\,Flow_{i,t} + \alpha_2 \Delta Debt_{i,t} + \alpha_3 Cash_{i,t-1} \\ & + \alpha_4 Size_{i,t} + \alpha_5 Growth\,Opportunities_{i,t} + \epsilon_{i,t}\end{aligned} \tag{3}$$

Table 10 The cash flow sensitivity of debt and cash holdings for private and public companies in Latin America

Panel A: Change in debt			Panel B: Change in cash holdings		
Variables	Private firms	Public companies	Variables	Private firms	Public companies
	Coefficient	Coefficient		Coefficient	Coefficient
Constant	−0.041** (0.017)	0.008 (0.010)	Constant	0.287*** (0.075)	0.156** (0.075)
Cash Flow	−0.138*** (0.018)	−0.029 (0.020)	Cash Flow	0.273*** (0.076)	0.023 (0.065)
Change in Cash	0.014*** (0.004)	0.029* (0.016)	Change in Cash	–	–
Change in Debt	–	–	Change in Debt	0.337*** (0.100)	0.545* (0.279)
Lagged Debt	0.000*** (0.000)	0.000*** (0.000)	Lagged Debt	–	–
Lagged Cash	–	–	Lagged Cash	0.000*** (0.000)	0.000*** (0.000)
Size	0.016*** (0.004)	−0.002 (0.002)	Size	−0.053*** (0.018)	−0.017* (0.009)
Growth Opportunities	0.000*** (0.000)	0.000*** (0.000)	Growth Opportunities	0.001*** (0.000)	0.000*** (0.000)
Observations	23,056	7,408	Observations	23,056	7,408
p value	< 0.001	< 0.001	*p* value	< 0.001	< 0.001
Firm effects	Yes	Yes	Firm effects	Yes	Yes
Year effects	Yes	Yes	Year effects	Yes	Yes
Adjusted R^2	0.0049	0.0148	Adjusted R^2	0.0392	0.0258

Displays the results of the three-stage least squares regressions. In Panel A, we present the results of the cash flow sensitivity of debt, where the dependent variable ($\Delta Debt$) is the annual change in total debt divided by total assets. In Panel B, we report the results of the cash flow sensitivity of cash, where the dependent variable ($\Delta Cash$) is the annual change in cash and cash equivalents divided by total assets. *CashFlow* is cash flow scaled by total assets; *Size* is the natural log of net assets; *GrowthOpportunities* measured by sales growth, are computed as the yearly growth rate of a firm's sales. Robust standard errors clustered at the firm level are in parentheses.

*, **, *** indicate the significance levels at 10%, 5% and 1% respectively

where, $\Delta Debt$ is the annual change in total debt divided by total assets; $\Delta Cash$ is the annual change in cash and cash equivalents divided by total assets; For the right-hand-side variables: *CashFlow* is cash flow scaled by total assets; *Size* is the natural log of net assets; *GrowthOpportunities* as measured by sales growth, computed as the yearly growth rate of a firm's sales. We also include in Eqs. 2 and 3 firm and year fixed effects. Given the aforementioned arguments, we expect α_1 in Eq. 2 to be negative and statistically significant for private firms and insignificant for their public peers. In Eq. 3, in turn, we expect the coefficient on α_1 to be positive and statistically significant for privately held firms but insignificant for public companies.

Table 10 displays the results from estimating Eqs. 2 (Panel A) and 3 (Panel B) separately for private and public companies.

The results displayed in Table 10 are consistent with our predictions. In Panel A of Table 10, we note that high cash flows are associated with debt reductions for privately

held firms, given the negative and highly significant coefficient on $CashFlow_{i,t}$ (−0.138). For their public counterparts, however, the coefficient on $CashFlow_{i,t}$ (α_1) is estimated insignificantly. Therefore, we empirically demonstrate in Panel A of Table 10 that private firms in Latin America display a negative cash flow sensitivity of debt, i.e., they use their cash flow to cut down debt. However, public companies' debt regressions reveal that they do not exhibit this propensity.

In Panel B of Table 10, where we report the results of the cash flow sensitivity of cash, we observe that higher levels of cash flow (α_1) are significantly associated with increases in cash changes for private companies but not for their public counterparts. More precisely, the estimates of Panel B of Table 10 reveal that for each dollar of incremental cash flow normalized by total assets, a private firm will save 27.3 cents to rebuild its cash levels. Public companies, on the flip side, display no propensity to save cash from additional cash flows. The evidence displayed in Table 10, therefore, makes it clear that Latin American private firms face higher levels of financial constraints relative to their public peers since theory predicts that financial constraints increase the cash flow sensitivity of cash.[10]

In sum, the results displayed in this section are consistent with our predictions and reveal that privately held firms rely on internal cash flows to both pay down debts and rebuild their cash levels.[11] Public companies in Latin America, on the other hand, are able to use external sources for both purposes.[12] Access to public markets, therefore, allows public companies to rely less on their internal cash flows and incur lower costs of carry. Private firms, in contrast, are more dependent on their cash flows and, consequently, incur higher costs of carry. Privately-held firms, consequently, cannot undertake all of their current positive NPV investments due to the fact that they face higher levels of financial constraints, so holding cash is costly for them because it requires sacrificing some attractive growth opportunities today to increase their ability to finance future projects. Thus, in some circumstances where the costs of carrying cash holdings are highly significant, as in our setting, we provide empirical evidence that privately-held firms retain significantly less cash savings relative to their public counterparts because they incur higher costs of carrying cash.

6 Concluding remarks

Despite being the dominant organizational form globally, private firms have received limited attention in the cash management literature, particularly regarding companies from emerging economies. In this research, we aim to fill this gap in the literature by analyzing the determinants of cash holdings in private and public companies in the Latin American setting. We also investigate whether Latin American privately held firms maintain lower or higher cash holdings than their public counterparts. We hypothesize that Latin American private firms maintain lower cash levels relative to their public peers due to the former's higher cost of carrying cash. Toward our objective, we use a comprehensive sample of

[10] The cash flow sensitivity of cash is a useful proxy of financial constraints due to its theoretical and empirical associations with the existence of financial constraints (Almeida et al. 2004; Almeida et al. 2014).

[11] The results of the cash flow sensitivity of debt and cash were similar when we used the matched sample.

[12] While our analysis reveals that privately held companies in Latin America choose to save cash out of incremental cash flows, Mortal et al.'s (2020) empirical results do not indicate the same. In fact, their results show that private firms in Western European countries are more likely to use cash to reduce debt. Their public counterparts, on the other hand, display a propensity to save cash out of cash flows.

private and public companies from the six largest Latin American economies: Argentina, Brazil, Chile, Colombia, Mexico, and Peru. The final sample includes 7222 firms (46,040 firm-year observations). The data are from the Capital IQ database and cover the period from 2000 to 2019.

Supporting our research hypothesis, we find compelling evidence that private firms in Latin America hold a statistically significant lower proportion of their assets in cash and cash equivalents compared to their public counterparts. These findings remain consistent even after controlling for various firm and country characteristics identified by existing research on corporate cash holdings as relevant in determining cash levels. Furthermore, our results are robust across various robustness checks, including using an alternative measure of cash levels and including firm fixed effects. To address potential self-selection bias based on observable firm characteristics, we employ the propensity score matching approach. Additionally, our results remain robust even when accounting for the endogeneity in the decision of a company to remain private or become publicly listed. We address this issue by employing the Heckman (1979) two-stage approach, which mitigates potential self-selection bias stemming from unobservable factors.

In sequence, we empirically demonstrate that private companies display a strong preference for saving cash holdings, i.e., the cash flow sensitivity of cash for private firms is positive and statistically significant. Stated differently, private companies in Latin America use their cash flows to rebuild their cash levels. Publicly traded companies, on the flip side, display no propensity to save cash out of cash flows. The fact that public companies' cash holdings are not systematically related to cash flows indicates that public companies are less financially constrained than their private counterparts. Additionally, we show that private firms in Latin America display a negative association between cash flows and debt, i.e., they use their free cash flows to reduce the amount of debt they carry. In contrast, their public counterparts show no propensity to reduce debt with their cash flows.

In sum, the analysis of the cash flow sensitivity of cash and debt for public and private firms in our setting reveals that private firms have to rely on cash flows to both payoff debt and save cash reserves. On the other hand, public companies can use external sources to cut down debts and build cash holdings. Therefore, access to public equity markets allows public companies to rely less on their cash flows and incur lower costs of carry. In contrast, private firms depend on their cash flows for operational and investment purposes and, consequently, incur higher costs of carry. Overall, our findings are important, as we demonstrate that firms' cash holdings are significantly influenced by the business environment in which they operate. Hence, in the Latin American setting, where companies often have less access to external capital at fair terms relative to companies from developed economies, we document that private firms maintain proportionally less cash holdings because the opportunity cost of holding cash is higher for them.

A significant factor contributing to the heightened opportunity costs experienced by privately held firms is their restricted access to external capital markets. In emerging economies, particularly in Latin America, private firms predominantly depend on internal cash flows to fund operational activities and investments. Their reliance on internal resources is compounded by the high costs of external financing, which are often unattainable due to heightened risk perceptions and weaker investor protection frameworks compared to those available to public firms. Additionally, private firms face substantial information asymmetries, which further inflate the costs of securing external capital. The inefficiency of financial infrastructure and the lack of robust capital market development in these regions results in higher transaction costs for private companies. As a result, the opportunity costs of holding cash are significantly greater, as limited access to external financing, elevated

transaction costs, and pronounced information asymmetry hinder effective resource allocation. Together, these factors amplify the financial challenges associated with maintaining cash reserves.

In light of our findings, we propose an additional, complementary explanation for the observed disparity in cash levels between private and public firms. While acknowledging that multiple factors likely contribute to this phenomenon, our empirical evidence suggests that the cost of holding cash plays a critical role in shaping the cash management strategies of private firms, particularly given their heightened financial constraints. Our perspective does not discount other possible explanations but seeks to enrich the existing discourse on corporate cash holdings by emphasizing the role of cash-holding costs in shaping cash levels among private and public firms.

Building on these insights, our study identifies several key factors that can assist managers in optimizing their cash management strategies. The findings emphasize the necessity of strategically managing cash balances, particularly given the significant financial constraints experienced by private firms in emerging markets. These constraints require a careful balance between maintaining adequate liquidity and minimizing the opportunity costs associated with holding excess cash. Consequently, it is recommended that managers implement advanced cash flow forecasting models to better align cash reserves with both operational and investment needs, thereby reducing the risk of excessive cash accumulation and its associated costs.

Additionally, our empirical results highlight the considerable burden that cash holding costs impose on private firms. To address this challenge, managers should consider short-term investment opportunities that offer reasonable returns while maintaining liquidity. Such investments can mitigate the financial impact of cash retention and improve overall financial performance. Furthermore, enhancing working capital management can further alleviate financial pressures. This may involve negotiating more favorable terms with suppliers and creditors to decrease the need for substantial cash reserves and reduce carrying costs. By adopting these strategies, managers can refine their cash management practices, ensure that cash holdings are more closely aligned with organizational needs, and ultimately enhance the financial efficiency of their firms.

We also propose several policy measures aimed at reducing the financial strain associated with holding cash balances for private firms. First, expanding access to financial markets is crucial. Governments and policymakers should consider implementing policies that facilitate credit access, particularly for smaller enterprises with limited collateral or track records. One potential approach is promoting public–private partnerships, where government-backed loan guarantees or financing programs reduce the risk for lenders, thereby improving credit access for private firms. The Brazilian Development Bank (BNDES) provides an example of this model by offering favorable credit terms for targeted industries. Similarly, the European Investment Bank's initiatives for small and medium-sized enterprises (SMEs) involve partial government guarantees to mitigate lender risks, offering a model that could be adapted in other regions.

Additionally, exploring the role of fintech platforms, such as peer-to-peer lending, could complement conventional financial institutions by providing alternative financing sources for smaller enterprises. Countries like India have demonstrated the potential of peer-to-peer lending platforms as a viable financing option for SMEs. When properly regulated, these platforms could enhance access to capital and reduce the financial strain caused by excessive cash reserves. Furthermore, fintech innovations, including the use of blockchain technology for financial transactions, present opportunities to lower transaction costs and improve funding access. Broadening the availability of external financing—not only for

strategic industries but also for private firms—could decrease their reliance on internal cash flows for operational and investment needs.

Second, reforms to improve financial infrastructure and market efficiency are also essential for lowering the cost of capital and, consequently, the costs of carrying cash reserves. Efforts to enhance market transparency, reduce transaction costs, and simplify regulatory processes for private firms should take priority. Streamlining credit access procedures and creating incentives for financial institutions to extend credit to privately held enterprises would further mitigate the opportunity costs associated with holding cash reserves.

Third, collaboration between governments and financial institutions is essential to designing financial instruments that address the specific requirements of private firms in emerging markets. For example, liquidity facilities or short-term financing solutions with competitive terms could help firms better manage cash flow fluctuations without requiring them to maintain excess cash reserves. Specialized "cash management" products that offer flexible access to capital for operational purposes would also reduce the need for large liquidity buffers. Commercial paper markets in developed economies serve as a relevant benchmark, where firms utilize short-term debt instruments to efficiently meet liquidity demands, minimizing the necessity for substantial cash holdings.

Finally, introducing targeted tax incentives could substantially reduce the costs of cash retention. Policymakers can promote more efficient use of cash reserves by offering tax breaks or deductions for private firms that invest in growth initiatives or infrastructure projects. Additionally, tax incentives for firms that allocate cash toward innovation and expansion could help offset the financial burden of holding excess cash. By implementing these policy measures, governments can foster a more supportive financial environment for private firms in emerging markets, ultimately reducing the costs associated with holding cash and enabling these firms to allocate resources more efficiently and to innovative investments that can promote growth and development in the country.

This study faces several limitations that pose challenges for future research. First, despite our best efforts, we have not completely resolved concerns related to endogeneity, which may continue to influence our findings. Another significant constraint is the unavailability of ownership information in the Capital IQ database, which prevents us from directly measuring the impact of ownership concentration on our findings. This limitation restricts our ability to explore how ownership structure influences our results. Additionally, the lack of detailed data on credit lines hinders our investigation of their direct effects on cash levels and determinants among Latin American public and private companies. To advance understanding in this area, future research should consider including additional firm-specific variables, such as ownership concentration and the presence of credit lines. These variables could provide deeper insights into the relationships studied here.

Although our sample period ends in 2019, we contend that the findings remain relevant to more recent years. The determinants of cash holdings for private and public firms, particularly in emerging economies like Latin America, are shaped by enduring structural and institutional conditions. These include restricted access to external capital, elevated financing costs, wake currencies and poor investor protection. While external disruptions, such as the COVID-19 pandemic, may have caused short-term fluctuations, the broader economic environment in Latin America continues to be characterized by these enduring challenges. As a result, we contend that the insights from our study maintain considerable applicability to current conditions.

However, we acknowledge that more recent data would allow for an updated analysis of how current economic conditions impact cash holdings. Future research, for example, could extend our study by incorporating data from 2020 onward to assess whether

the observed patterns persist in the face of recent disruptions, such as the COVID-19 pandemic, trade wars, and armed conflicts, and their economic consequences. Additionally, exploring precautionary motives and liquidity constraints during particular periods of economic crises could provide deeper insights into the financial resilience of private versus public enterprises in response to external shocks. Such research would contribute to a more comprehensive understanding of how corporate cash management strategies evolve in times of global economic uncertainty.

Appendix

In Appendix, we offer the theoretical rationale for the inclusion of control variables in our regression model, detailing the anticipated relationships between these factors and corporate cash holdings.

Size: Larger firms tend to hold smaller amounts of cash on their balance sheets due to economies of scale in cash management. As a result, a negative association is expected between firm size and cash holdings. Firm size is proxied by the natural logarithm of net assets, defined as total assets minus cash and cash equivalents (Almeida et al. 2004; Ozkan and Ozkan 2004; Bates et al. 2009; Manoel and Moraes 2022b).

Dividend dummy: A firm that currently pays dividends is better able to accumulate cash by reducing its dividend payments (Opler et al. 1999; Ozkan & Ozkan 2004; Dittmar & Mahrt-Smith 2007). Thus, we expect Latin American firms that pay dividends to hold proportionally less cash reserves than non-dividend paying firms. Similar to Opler et al. (1999), we use a binary variable set equal to one in years where a firm pays a dividend and 0 otherwise.

Cash Flow: Companies with high cash flows may be able to accumulate more corporate cash holdings. In this sense, we expect a positive association between cash flow, computed as the ratio of cash flow to net assets, and cash holdings (Mortal et al. 2020).

Net Working Capital: Firms can use non-cash liquid assets when they have cash shortfalls. In addition, the cost to convert non-cash liquid assets into cash is lower in comparison with other assets (Ozkan and Ozkan 2004; Bates et al. 2009). Thus, we expect a negative association between NWC, measured by the ratio of working capital (non-cash current assets minus current liabilities) to net assets, and cash levels.

Growth Opportunities: Firms with valuable growth opportunities tend to require greater funds to avoid relying on costly external financing and to minimize the opportunity costs of missed profitable investments. Accordingly, we expect a positive association between cash levels and growth opportunities. To proxy for growth opportunities, we use sales growth, measured as the annual growth rate of a firm's sales (Bigelli and Sánchez-Vidal 2012; Mortal and Reisel 2013; Deloof et al. 2020; Mortal et al. 2020; Amberger and Robinson 2024).

Short-Term Debt: Companies can increase their level of short-term debt to build cash reserves. From this perspective, a negative association between short-term debt, measured by the ratio of total short-term debt to total assets, and cash is expected (Almeida et al. 2004; Arslan et al. 2006).

Leverage: Leverage is a crucial factor in assessing a firm's cash holdings. Companies with high leverage tend to accumulate more cash as a precaution against potential financial distress, suggesting a positive relationship between leverage and cash (Al-Najjar 2013). However, Ozkan and Ozkan (2004) suggest an alternative scenario where

leverage could be negatively associated with cash holdings, as it also serves as a proxy for firms' debt issuance capacity. These contrasting perspectives highlight the potential ambiguity in the relationship between leverage, measured by the ratio of total debt to net assets, and cash levels.

Return on Assets: Profitable organizations are better able to distribute dividends, cut down debts, and stockpile cash (Al-Najjar 2013). These factors suggest a positive relationship between a firm's profitability and its cash levels. Following Faulkender et al. (2019), the Return on Assets, obtained as Operating Income to Net Assets, was used to measure profitability.

Tangibility: Firms with a larger proportion of tangible assets, such as property, plant, and equipment (PPE), can sell part of these assets if an immediate need for cash arises. This suggests a negative association between tangible assets and cash holdings. Tangible assets are measured as the ratio of net PPE, which is property, plant, and equipment net of accumulated depreciation, to net assets (Ozkan and Ozkan 2004; Fernandes and Gonenc 2016; Manoel and Moraes 2022b).

Age: Older firms generally have more stable cash flows, lower investment opportunities, and require less cash holdings (Mortal et al. 2020). In this sense, Mortal et al. (2020) suggest a negative association between firms' age and cash holdings. To measure firm age, we use the natural logarithm of the number of years since the company was founded.

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Declarations

Conflict of interest The authors have no conflicts of interest to declare.

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