

What Do We Know About Corporate Cash Holdings? A Systematic Analysis

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INTRODUCTION

Cash holdings play an important role at the heart of firms' policies. In fact, holding cash is the most common way for firms to ensure liquidity (Almeida, Campello, Cunha, & Weisbach, 2014). Cash reserves allow firms to respond to unexpected changes in cash flows, to fund daily operations, to finance long-term investment, and to hedge risk (Acharya, Almeida, & Campello, 2007; Almeida, Campello, & Weisbach, 2004; Bates, Kahle, & Stulz, 2009; Opler, Pinkowitz, Stulz, & Williamson, 1999).

Because cash represents a valuable and strategic asset (Haushalter, Klasa, & Maxwell, 2007; Kim & Bettis, 2014), comprehending cash policy is a relevant issue if we want to enhance and refine our knowledge regarding firm value, corporate investment and financing choices (Almeida et al., 2014) and to understand

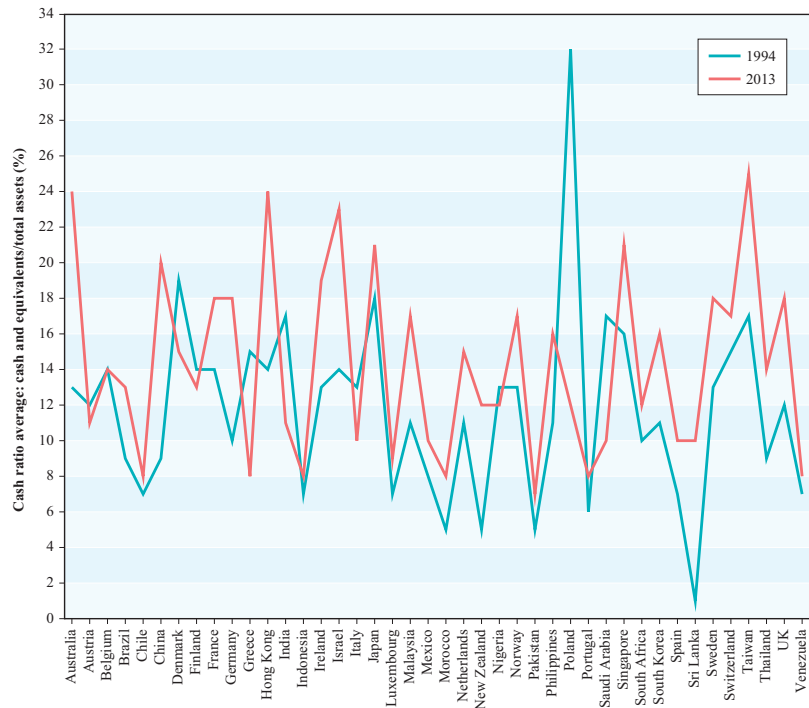
its implications for corporate profitability, risk, and economic growth (Acharya, Almeida, Ippolito, & Perez, 2014; Campello, Giambona, Graham, & Harvey, 2011; Graham & Leary, 2016). In this regard, three related facts have contributed to strengthen the importance of cash holdings in the corporate finance field.

First, a dramatic increase in cash reserves has been noticed in both U.S. firms and firms abroad in recent years (Almeida et al., 2014; Bates, Chang, & Chi, 2018; Cole, 2014; Le Guyader, 2012; Marcum, Martin, & Strickland, 2011; Marcum, Martin, & Strickland, 2012; Orlova & Rao, 2018; Phan, Nguyen, Nguyen, & Hegde, 2019; Prescott, 2015). Among non-financial S&P 500 firms, cash holdings increased fivefold from 1996 to 2012, reaching \$1,334 billion (Almeida et al., 2014). Not only absolute but

also relative values of cash holdings have experienced a consistent growth all over the world, Chen, Dou, Rhee, Truong, and Veeraraghavan (2015) cite a study from the International Institute of Finance that estimated corporations in the United States, Euro Zone, the United Kingdom, and Japan to hold \$7.75 trillion in cash or cash equivalent. The authors also find that the median cash to total asset ratios varied over the period 1989–2009: from 2.3% for New Zealand to 3.6% for Russia, 5.2% for Australia, 8.0% for Finland, 10.1% for Sweden, 13.7% for Singapore, and 16.6% for Hong Kong. Focusing on two different times in a 20-year window using *Compustat Global Data*, we confirm this upward trend for cash-holding ratios around the world, as shown in Exhibit 1, Cash ratio average (percentage) across the world in 1994 and 2013.

Exhibit 1

Cash Ratio Average (%) Across the World in 1994 and 2013.



Second, cash holdings are closely related to firms' financing choices. As a financing instrument, cash holdings can be used to undertake profitable investment opportunities (Ferreira & Vilela, 2004), to reduce the cost of accessing external financing (Almeida et al., 2004), to service debt during economic distress (Acharya et al., 2007), and to serve as a resource during difficult times (Campello et al., 2011).

Third, cash holdings are also linked to risk management strategy. As a risk management tool, cash might reduce cash flow volatility and consequently mitigate financial risks that could affect a firm's future profits (Acharya et al., 2007).

Nonetheless, holding cash is not costless due to the presence of transaction costs such as taxes and flotation fees, implying the value of maintaining cash (Faulkender & Wang, 2006).

Moreover, if cash is used to protect against future shortfalls, firms might bypass interesting investment opportunities, particularly when facing financing constraints (Almeida et al., 2004; Bates et al., 2009). Supporting this view, Almeida et al. (2004) shed light on the cash holdings sensitivity to cash flows when a firm faces financial constraints. If a firm is financially constrained, it may have to incorporate savings from incremental cash flows to protect its future. As a

result, the firm might hold a considerable portion of cash as a hedging tool for downturns.

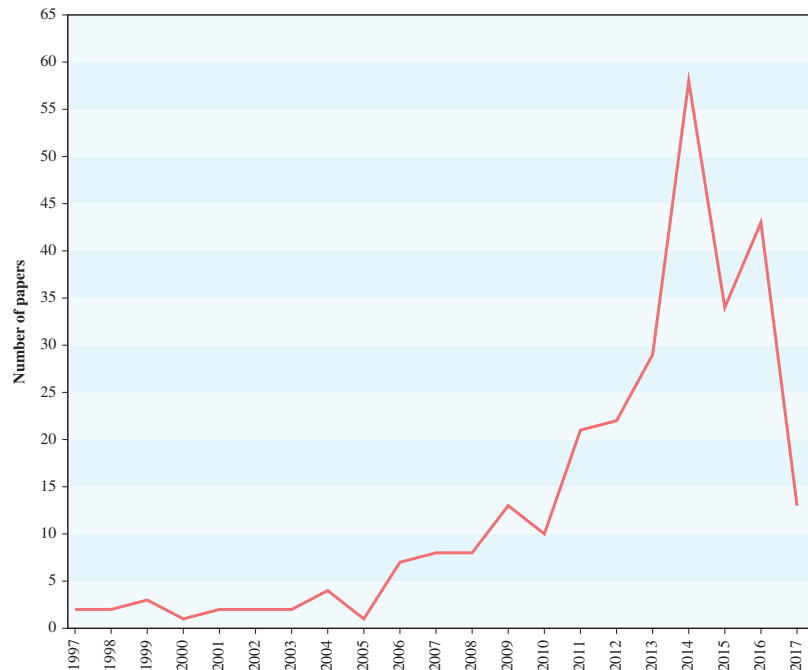
In the cash holdings literature, some researchers focus on why firms hold cash, how firms employ cash in corporate decisions and what the real consequences of corporate cash choices are.

Interest in corporate cash holdings extends back at least as far as Keynes (1936). Notably, growth has occurred in the literature since the mid-1990s, when cash holdings became an active topic in liquidity research, as shown in Exhibit 2, Papers published by year.

Although a considerable body of work has been produced, there remains a lack of

Exhibit 2

Papers Published by Year.



research that compiles and systematizes the available knowledge on cash holdings. Thus, understanding and mapping the debate on corporate cash holdings may provide better insight about the direction for research and help to identify potential gaps. We therefore focus on two main questions: What do we know about cash holdings? What are the main insights on which to focus regarding future research on cash holdings?

To address these questions, we present a systematic literature review of nearly 290 papers published from 1997 to 2017, pinpointing the most relevant articles on cash holdings and identifying major gaps in the current literature following Lage Junior and Godinho Filho

(2010), Seuring (2013), and Jabbour (2013)'s methodology.

The remainder of the paper is organized as follows. Section 2 describes the research design, highlighting the method, and the database of scientific papers investigated in our review (e.g., Scopus, Web of Science, etc.). Section 3 provides the main approaches on corporate cash holdings. Section 4 delineates the features of the analyzed articles, including papers cited most often, scholar networks, and the research pathway on cash holdings. In Section 5, research gaps are identified and suggestions are made regarding avenues for future research. Section 6 presents the concluding remarks.

RESEARCH DESIGN

Following the methods of Lage Junior and Godinho Filho (2010), Seuring (2013), and Jabbour (2013) for the proposed literature review and research agenda, we performed a wide search of published papers from 1997 to 2017 in different academic journal databases, including *Scopus*, *Wiley*, *Web of Science (WOS)*, *Academic Search Complete PLUS (Ebsco)*, *JSTOR*, *Taylor & Francis*, *Emerald*, and *Springer*. This methodology allowed us to track the evolution and the main contributions of the cash holding research and to identify challenges and insights for future research in the field. We focused on

theoretical and empirical articles that have been published on cash holdings over time.

Although the studies of Almeida et al. (2014) and Amess, Banerji, and Lampousis (2015) have respectively attempted to present a literature review on corporate liquidity management and precautionary and agency reasons to hold cash, extensive research on cash holdings that highlights links, attributes, and core debates on cash holdings remains to be addressed. We also identify a gap left by Almeida et al. (2014) by considering the liquidity literature regarding estimates of the value of cash and the real consequences of holding cash.

We first browse all available papers on cash holdings using the keywords “cash,” “cash ratio,” “cash holdings,” “corporate cash reserves,” “cash management,” “liquid assets,” and “corporate liquidity” in the databases, collecting and analyzing the articles between December 2016 and June 2017. This search revealed that 290 papers were published in the period from 1997 to June 2017. Of these, 144 papers published in journals with an impact factor of 1 or greater were selected to assess the evolution of and linkages among research topics related to corporate cash holdings. These papers were then coded and analyzed according to the 10 categories shown in Exhibit 3, Main categories of survey analysis.

Category 1 introduces the paper’s main approach that was identified from the keywords, abstract and introduction and was coded on a scale from A to F. Category 2 refers to the methodology employed in each paper, which was coded on a scale from A to F. In

Category 3, the statistical tool/data analysis was coded on a scale from A to E. Category 4 presents the position of the cash holdings variable in the empirical model, coded on a scale from A to D. Category 5, which relates to the variables source used in the analysis, was coded on a scale from A to G. Categories 6, 7, and 8 were associated with the study level, context and time analysis, respectively, coded on a scale from A to G. Finally, categories 9 and 10 classify the theoretical perspective used by the authors (scale A to E) and their findings (scale A to F), respectively.

Exhibit 4, Data classification and categorization for each paper, lists the data classification and categorization for each paper. The descriptive statistics for each category are estimated and evaluated concurrently with the paper content.

After coding the articles, we develop a summary that includes goals, primary conclusions, contributions, and limitations for each paper, as presented in Exhibit 5, Paper goal, main conclusions, contributions, and limitations. The articles are arranged in alphabetical order according to the surname of the first author. It is important to highlight that all paper limitations have been noted by the authors themselves.

APPROACHES REGARDING CASH HOLDINGS: A BRIEF OVERVIEW

Comprehending the reasons firms hold cash, the effects of cash holdings on corporate decisions, and the cash dynamic inside firms has

become increasingly relevant to corporate finance research and practice. To address these issues, the next section presents the main approaches related to cash holding research, including the optimal cash level, the motivations of holding cash, the determinants of cash holdings, the value of cash holdings, and the sensitivity of cash.

The Optimal Cash Level

Models on the optimal level of cash have been widely discussed and applied to support theoretical insights and empirical findings on cash holdings behavior. Earlier cash holdings optimization models were discussed by Baumol (1952), Tobin (1956), Miller and Orr (1966), Archer (1966), Daellenbach (1974), and Budin and Handel (1975). However, optimization models have considerably evolved over time. For instance, Kim, Mauer, and Sherman (1998) develop a model of optimal cash holding based on a cost benefit-trade-off between the cost of carrying cash and the benefit of taking future investment opportunities via internal funds. Specifically, the authors predict that the optimal investment in cash reserves is positively related to the cost of external financing, the uncertainty of expected cash flows, and the return on investment opportunities, and negatively associated with size, investment in physical assets, and financial distress.

In Riddick and Whited (2009), optimal cash policy relies on the cost of external finance and future financing needs. In this setting, firms hold a higher level of precautionary cash holdings when

Exhibit 3

Main Categories of Survey Analysis

<i>Order</i>	<i>Category</i>	<i>Subcategory</i>
1	Main focus	A—Determinants and antecedentes of cash holdings
		B—Value of cash holdings
		C—Precautionary, transaction cost, and/or speculative (investment opportunities) motives of excess cash
		D—Agency conflicts
		E—Financial constraints and credit supply shocks
		F—Sensitivity of cash to cash flow and/or to investment
2	Method	A—Conceptual/theoretical
		B—Quantitative (empirical and mathematical model)
		C—Qualitative
		D—Quantitative/qualitative or qualitative/quantitative
		E—Cases
		F—Survey
3	Statistical tool/data analysis	A—Mathematical modeling
		B—Standard econometric
		C—Computational method
		D—Multivariate analysis
		E—Not applicable
4	Position in analytical model	A—Dependent variable
		B—Independent variable
		C—Used to construct other variable
		D—Not applicable
5	Variable source	A—From balance sheet
		B—From market
		C—Macroeconomic variables
		D—Exogenous variables
		E—Primary data
		F—Others
		G—Not applicable
6	Level of analysis	A—Country
		B—Business group/conglomerate
		C—Sector/industry
		D—Firm
		E—Others
		F—Not applicable

(Continues)

<i>Order</i>	<i>Category</i>	<i>Subcategory</i>
7	Study context	A—World
		B—USA/Canada
		C—Europe
		D—Asia/Oceania
		E—Latin America
		F—Africa
		G—Not applicable
8	Analysis period	A—More than 10 years
		B—Between 5 and 10 years
		C—Between 3 and 5 years
		D—Less than years
		E—Not applicable
9	Theoretical perspective	A—Trade-off theory
		B—Packing order theory
		C—Agency-based theories
		D—Other perspectives contemporary trends
		E—Not applicable
10	Findings	A—New perspectives
		B—Consistent with previously published literature
		C—Previous model with different dataset/time period
		D—Comparative study
		E—Others
		F—Not applicable

external financing is costly or income uncertainty is high. Palazzo (2012) notes that the optimal cash-holding policy depends on the trade-off between the dividend distribution decision in the present and the cash reserve to prevent the high costs of future external financing.

Almeida, Campello, and Weisbach (2011) focus on the optimality of corporate financial policies and the potential costs of external finance in the future, predicting that firms have a propensity to allocate funds to safer and more liquid assets (e.g., cash) in the presence of financial constraints. Conversely, by relaxing current and future financing

constraints, the model foresees that firms might invest in riskier and more illiquid assets.

Hugonnier, Malamud, and Morellec (2014) suggest that firms must simultaneously make three interrelated decisions regarding their cash-holding policy, investment time, and financing funds to obtain optimal cash levels. In this setting, Hugonnier et al. (2014) assume that firms facing capital supply constraints have less ability to raise external funds and tend to hold more cash to protect themselves against default risk. However, as cash is considered an asset with a lower return, firms might choose a target level for cash holdings that allows them

to distribute dividends or to keep earnings and pursue investments, depending on the relationship between cash holdings and target levels.

Motivations for Holding Cash and Equivalents

Firms might maintain cash for numerous purposes. Transaction motives, speculative motives, precautionary reasons, taxes, agency conflicts and incentives, financial constraints, diversification, defensive strategies, and product market competitiveness are the main explanations presented over the past years by researchers.

The transaction motive is related to business operational

Exhibit 4

Data Classification and Categorization for Each Paper

N	Author(s)	Category									
		1	2	3	4	5	6	7	8	9	10
1	Acharya et al. (2007)	E	B	A, B, D	C	A, B	D	B	A	A, D	A, B
2	Acharya, Davydenko, and Strebulaev (2012)	E	B	A, D	B	A, B, C	D	B	A	A	A, B
3	Acharya and Merrouche (2012)	E	B	A, B	B	A, B	D	C	D	D	A, B
4	Acharya et al. (2013)	C	B	A, B, D	B	A, B, C	D	B	A	C	A, B
5	Acharya et al. (2014)	C	B	A, B, D	B	A, B	D	B	A	A, B	A, B
6	Agliardi, Agliardi, and Spanjers (2016)	C	B	A, C	D	G	F	G	E	B	A, B
7	Al-Najjar (2013)	A	B	B	A	A	A, D	D, E	B	D	B, C, D
8	Al-Najjar (2015)	A	B	B	A	A, B, D	D	C	B	A	B
9	Alimov (2014)	B	B	D	B	A, B, D	D	B	B	D	A, B
10	Almeida et al. (2004)	E, F	B	A, B, D	C	A, B, D	D	B	A	B	B
11	Almeida and Campello (2010)	E	B	B, D	B	A, B	D	B	A	A	A, B
12	Almeida, Campello, and Hackbarth (2011)	C	B	A, B, D	C	A, B	C	B	A	A, D	A, B
13	Almeida, Campello, and Weisbach (2011)	E	B	A	D	A, B	D	H	E	A	A
14	Almeida et al. (2014)	E	A	A, E	D	F	E	H	E	D	G
15	Anderson and Carverhill (2012)	F	B	A, B, C	D	A, B	D	B	A	A	A, B
16	Anderson and Hamadi (2016)	D	B	B	A	A, B	D	C	A	C	A, B
17	Andrén and Jankensgård (2015)	F	B	B	A	A	D	B	B	C	B
18	Arnold (2014)	D	B	A	D	A, B, D	D	H	E	C	B
10	Arouri and Pijourlet (2015)	B	B	B	A	A, B	D	A	C	C	A, B
20	Arslan et al. (2006)	F	B	B	A	A, B, D	B	D	C	C	B, C
21	Azar et al. (2016)	C	B	B	A	A, C	D	B	A	D	A, B
22	Bakke and Gu (2016)	C	B	A, B, C	A	A	C, D	B	A	D	A, B
23	Baldenius (2006)	D	B	A	D	A, B, D	D	H	E	D	A
24	Bao et al. (2012)	F	B	B, D	C	A, B	D	B	A	D	A, B
25	Bates et al. (2009)	C	B	B, D	A	A, B	D	B	A	A	B

(Continues)

N	Author(s)	Category									
		1	2	3	4	5	6	7	8	9	10
26	Beuselink and Du (2016)	A	B	B	A, B	A, C	D	B, D	B	C	A
27	Bigelli and Sánchez-Vidal (2012)	A	B	B, D	A	A, B, C, D	C, D	C	B	D	B
28	Bliss et al. (2015)	E	B	B	B	A, B, D	D	B	A	D	A, B
29	Boileau and Moyen (2016)	C	B	A, C	C	A	D	B	A	D	A, B
30	Boufin et al. (2013)	E	B	B, D	C	A, B, C, D	B	C	B	D	A, B
31	Breuer, Rieger, and Soyapak (2016)	A	A, B	A, B	A	E	A	A	D	D	A
32	Brisker et al. (2013)	C	B	D	C	A, B, D	D	B	A	D	A, B
33	Brown and Petersen (2011)	E	B	B	C	A, B	D	B	A	D	A, B
34	Cabello (2017)	E	A	A	D	G	F	G	E	D	A
35	Campello et al. (2010)	E	B, F	D	C	A, B, E	D	A	D	A	A, B
36	Campello et al. (2011)	E	B, F	D	C	A, B, E	D	A	D	C	A, B
37	Chen (2008)	D	B	B	A	A, B, D	D	B	C	C	A, B
38	Chen and Chuang (2009)	D	B	B	A	A, B	D	B	B	D	B
39	Chen et al. (2012)	D	B	B	A	A, B, D	D	D	B	D	A, B
40	Chen et al. (2014)	D	B	B	A	A, B, C, D	D	D	D	D	A, B
41	Chen, Dou, et al. (2015)	A	B	B	A	A, C, F	A, D	A	A	C	A, B
42	Chen, Harford, and Lin (2015)	D	B	B	B	A, D	D	B	A	C	A, B
43	Cheung (2016)	D	B	B	A, B	A	D	B	A	D	A, B
44	Colquitt et al. (1999)	A	B	B	A	A, B	D	B	D	C	B
45	Core, Guay, and Verdi (2006)	D	B	B	B	A	D	B	A	D	B, C
46	Custódio and Metzger (2014)	A	B	B, D	B	A, B, D	D	B	A	A, D	A, B
47	O'Brien (2017)	D	B	B	A	A, D	C, D	B	A	C, D	C, B
48	Décamps, Mariotti, Rochet, and Villeneuve (2011)	A	B	A	D	A, B	D	H	E	C, D	A
49	Denis and Sibilkov (2010)	B, E	B	B	C	A, B	D	B	A	C	B
50	Denis (2011)	A	A	E	D	E	F	G	E	E	D
51	Disatnik, Duchin, and Schmidt (2013)	A	B	A, B	B	A, B, D	D	B	C	D	A, B
52	Dittmar et al. (2003)	D	B	D	A	A, B, C	A, D	A	D	C	B
53	Dittmar and Mahrt-Smith (2007)	B, D	B	B	C	A, B	D	B	A	C	B, C
54	D'Mello, Krishnaswami, and Larkin (2008)	A	B	B, D	A	A, B, D	C, D	B	A	C	A, B
55	Doidge and Dyck (2015)	A	B	B	B	A, B, D	D	B	B	D	A, B

(Continues)

N	Author(s)	Category									
		1	2	3	4	5	6	7	8	9	10
56	Drobetz et al. (2010)	B	B	B	B	A, B	A, D	A	A	C	B, C
57	Duchin (2010)	A	B	B	A	A, B	C, D	A	A	C	B
58	Dudley and Zhang (2016)	D	B	B	A	A, D, E	A, D	A	A	C	A, B
59	Faff, Kwok, Podolski, and Wong (2016)	A	B	A, B	C	A, C, D	D	B	A	D	A, B
60	Faley (2004)	D	B	B, D	B	A, B, D	D	B	A	C	A, B
61	Faulkender and Wang (2006)	B	B	B, D	C	A, B	D	B	B	C	A, B
62	Feng and Johansson (2014)	A	B	B, D	A	A, B	D	D	A	C	B
63	Fernandes and Gonenc (2016)	A	B	B	B	A, B, C, D	A	A	A	D	A, B
64	Fritz Foley et al. (2007)	B	B	B	A	A, B, D	D	B	A	C	B
65	Francis et al. (2014)	E	B	D	A	A, B, D	D	B	A	D	A, B
66	Fresard (2010)	E	B	D	B	A, B, D	C, D	B	A	C	A, B
67	Frésard and Salva (2010)	D	B	B	B	A, B, C	A, D	A	A	D	B
68	Fresard (2011)	F	B	B	C	A, B	D	B	A	C	A, B
69	Gamba and Triantis (2008)	C	B	A	D	A, B	D	H	E	D	A
70	Gao (2011)	A	B	B	C	A, B	D	B	A	C	A, B
71	Gao et al. (2013)	A	B	B	A	A, B	C, D	B	A	C	A, B
72	Gao and Jia (2015)	B	B	B	B	A	D	B	C	C	A, B
73	Ghaly, Dang, and Stathopoulos (2015)	A	B	B	A	A, D	D	B	B	D	A, B
74	Gore (2009)	A	B	B	A	A, B	C	B	B	C	A, B
75	Gryglewicz (2011)	E	A	A	D	G	F	G	E	D	A
76	Han and Qiu (2007)	C	B	B	A	A, B	D	B	B	C	A, B
77	Hansen and Wagner (2017)	C, F	B	B	B	A, B	D	A	A	D	B, D
78	Harford (1999)	D	B	B	C	A	C, D	B	A	A	A, B
79	Harford et al. (2008)	D	B	B, D	A	A, B	D	B	A	C	B
80	Harford et al. (2014)	A	B	D	B	A, B, D	C, D	B	A	C	A, B
81	Haushalter et al. (2007)	A	B	B, D	A	A, B	C, D	B	B	D	A, B
82	Haw et al. (2011)	B	B	D	B	A, B, C, D	D	A	B	A, B	A, B
83	He and Wintoki (2016)	A	B	B	A	A	D	B	A	D	A, B
84	Hoberg et al. (2014)	C	B	B	C	A, B	C, D	B	A	D	A, B
85	Holmström and Tirole (1998)	D	B	A, C	D	G	D	H	E	A	A

(Continues)

N	Author(s)	Category											
		1	2	3	4	5	6	7	8	9	10		
86	Hsu, Huang, and Lai (2014)	D	B	B	A	A	D	B	B	C	B	C	B
87	Huang and Wang (2009)	C	B	A, B, D	C	A, B	D	B	A	A	A	A	A, B
88	Huang et al. (2013)	A	B	D	A	A, B, C	D	A	A	C	A	C	A, B
89	Huang, Guo, Ma, and Zhang (2015)	C	B	B	B	A	D	B	B	C	B	C	A, B
90	Hugonnier et al. (2014)	A	B	A	D	F	E	H	E	D	A	A	A
91	Iskandar-Datta and Jia (2012)	A	B	B	A	A	A	A	A	C, D	A, B	A, B	A, B
92	Itzkowitz (2013)	A, C	B	B	A	A, B	D, E	B	A	A	B	A	B
93	Jain, Li, and Shao (2013)	A	B	B	A	A, B	D	B	B	D	B	D	B
94	Jiang and Lie (2016)	A	B	B	A	A	D	B	A	C	B	B	B
95	Kahle and Stulz (2013)	E	B	D	C	A, B, D	D	B	A	C	B	B	B
96	Kalcheva and Lins (2007)	D	B	B	A	A, B	D	A	D	C, D	B	B	B
97	Kim et al. (1998)	A	B	B	A	A, B	C, D	B	A	A, D	A, B	A, B	A, B
98	Kim and Bettis (2014)	C	B	B	B	A	D	B	A	C	B	B	B
99	Kisser (2013)	B	A, B	A, C	B	A	D	B	B	C	A, B	A, B	A, B
100	Klasa et al. (2009)	A	B	D	C	A, B	D	D	A	D	B	B	B
101	Koussis et al. (2017)	C	A	A	D	G	E	G	E	C, D	A	A	A
102	Kuan, Li, and Chu (2011)	D	B	D	A	A, B	D	D	A	D	B	B	B
103	Kusnadi and Wei (2011)	F	B	B	C	A, B, D	D	A	B	D	B	B	B
104	Kusnadi et al. (2015)	A	B	B	A	A, D	D	D	B	D	B	B	B
105	Lamont (1997)	E	B	D	C	A	C, D	B	D	D	A, B	A, B	A, B
106	Larkin (2013)	A	B, F	B	B	A, B	D	B	A	C, D	B	B	B
107	Lee and Suh (2011)	A	B	D	B	A, B, C	A, D	A	B	C	B	B	B
108	Levitas and McFadyen (2009)	A	B	D	C	A, B	D	B	B	D	B	B	B
109	Lins, Servaes, and Tufano (2010)	C	B, F	D	C	A	D	A	D	D	A, B	A, B	A, B
110	Liu and Mauer (2011)	B	B	A	A	A, B	D	B	A	A	B	B	B
111	Liu, Mauer, and Zhang (2014)	B	B	B	A	A, B	B	C	B	D	B	B	B
112	Liu, Luo, and Tian (2015)	D	B	B	A	A	D	D	B	C	A, B	A, B	A, B
113	Locorotondo, Dewaelheyns, and Huille (2014)	A	B	B	B	A, B	B	C	B	D	B	B	B
114	Louis et al. (2012)	B	B	B	C	A, B	D	B	A	D	B	B	B
115	May (2014)	E	B	B	B	A, B	D	B	D	D	A, B	A, B	A, B

(Continues)

N	Author(s)	Category									
		1	2	3	4	5	6	7	8	9	10
116	Megginson et al. (2014)	B	B	B	A	A, B	A, C, D	D	A	D	A, B
117	Meltzer (1963)	A	B	B	D	A	C, D	B	A	D	A, B
118	Mikkelsen and Partch (2003)	A	B	B	C	A, B	C, D	B	A	C	B
119	Mun and Jang (2015)	C	B	B	B	A	D	B	A	D	A, B
120	Nason and Patel (2016)	B	B	B	B	A	D	B	B	D	A, B
121	Neamtiu, Shroff, White, and Williams (2014)	E	B	A, D	A	A, B, C	D	B	A	A	B
122	Nikolov and Whited (2014)	D	B	A, D	C	A, B, C	D	B	A	C	A, B
123	Opler et al. (1999)	A	B	B	A	A, B	C, D	B	A	D	A, B
124	Orens and Reheul (2013)	A	B, F	B	A	A, E	D	C	D	D	A, B
125	Ozkan and Ozkan (2004)	A	B	B	A	A, B	D	C	A	D	B
126	Palazzo (2012)	C	B	A, B	B	A, B	D	B	A	E	A, B
127	Pinkowitz and Williamson (2001)	C	B	B	A	A, B	A, B, D	A	A	A, D	A, B
128	Pinkowitz et al. (2006)	D	B	B	C	A, B, C	A, D	A	A	A	B
129	Pinkowitz et al. (2013)	A	B	D	C	A, B, D	D	B	A	C	A, B
130	Qiu and Wan (2015)	E	B	B	A	A, B	C, D	B	A	D	A, B
131	Ramirez and Tadesse (2009)	A	B	B	A	A, B, C	A, D	A	A	A	A, B
132	Rapp et al. (2014)	A	B	D	C	A, B	D	B	A	A, D	B
133	Riddick and Whited (2009)	F	B	A, B, C, D	C	A, B	D	A	A	B, C	A, B
134	Schroth and Szalay (2009)	E	B	A, B	B	A, D	E	B	A	D	A, B
135	Simutin (2013)	A	B	B	C	B	B	B	A	D	A, B
136	Smith (2016)	A	B	B	A	A, D	D, E	B	A	C	A, B
137	Song and Lee (2012)	E	B	D	A	A, B, D	D	D	A	D	B
138	Subramaniam et al. (2011)	A	B	B	C	A, B	C, D	B	A	D	B
139	Tong (2010)	D	B	B	B	A, B, C	D	B	B	C	B
140	Tong (2011)	A, B	B	B	C	A, B	C, D	B	B	C	B
141	Wu, Rui, and Wu (2012)	E	B	B	A	A, B, C	D	D	A	C	A, B
142	Xu et al. (2016)	D	B	B	A, B	A, B, D	D	D	A	C, D	A, B
143	Yun (2009)	D	B	D	A	A, B	D	D	A	C	A, B
144	Yung and Nafar (2014)	A	B	B	A	A	A	A	A	C	A, B

needs, whereas the speculative motive is associated with profitable future investment opportunities (Bates et al., 2009; Dittmar, Mahrt-Smith, & Servaes, 2003). In a setting of valuable investment opportunities, cash holdings are considered an important source of internal capital (Lamont, 1997) that enables firms to take advantage of growth opportunities, to avoid higher costs of raising funds, and to increase their financial flexibility (Gamba & Triantis, 2008; Rapp, Schmid, & Urban, 2014).

The precautionary motive arises when firms are likely to face any constraints or uncertainty related to future economic or business conditions (Keynes, 1936). Under a tax-based perspective, firms would hold cash overseas to avoid taxation costs associated with the repatriation of foreign income (Fritz Foley, Hartzell, Titman, & Twite, 2007) or/and to pay future tax claims on prior and current tax positions (Dyreng, Hanlon, & Maydew, 2008).

In the presence of agency conflicts, cash holdings cannot be collateralized given the transformation risk associated with agent misbehavior (Myers & Rajan, 1998). The agency motive suggests that compensation and governance mechanisms such as higher investor protection, better law enforcement, and stronger capital markets prevent managers from holding excess cash and disgoring cash on value-decreasing projects (Dittmar et al., 2003; Ferreira & Vilela, 2004; Gao, Harford, & Li, 2013; Harford, Mansi, & Maxwell, 2008; Jensen, 1986; Jensen & Meckling, 1976; Yung & Nafar, 2014).

Agency incentives aim to discipline manager misbehavior regarding the efficient use of cash and to align managers and shareholders interests to enhance firm value (Anderson & Hamadi, 2016; Cheung, 2016; Dittmar et al., 2003; Dudley & Zhang, 2016; Louis, Sun, & Urcan, 2012; Nikolov & Whited, 2014; Deb et al., 2017). However, agency conflicts can have a relevant impact in cash holdings of corporations. For instance, Im, Park, and Zhao (2017) analyze that value of cash is affected by uncertainty through agency conflicts and financial constraints, whereas Bhuiyan and Hooks (2019) discuss that problem directors in the board of a company weaken corporate governance and encourage excess cash holdings.

In addition, country-level variables can also impact cash holdings due to agency problems. Dudley and Zhang (2016) suggest that agency hypothesis predicts that shareholders will demand firms to disgorge more cash in countries with lower level of societal trust. Loncan (2018) finds that mitigation of agency conflicts and reduction of financing constraints can be associated with the negative impact of foreign institutional ownership in cash holding, using a sample of firms in emerging economies.

The financial constraints perspective suggests that firms may reduce the cost of accessing external financing, mitigate and refinance liquidity risk, decrease the likelihood of bypassing value-enhancing investments, and/or hedge against future shortfalls when maintaining cash reserves (Acharya, Almeida, & Campello, 2013; Acharya et al., 2007; Almeida & Campello,

2010; Almeida et al., 2004; Bliss, Cheng, & Denis, 2015; Boutin, Cestone, Fumagalli, Pica, & Serrano-Velarde, 2013; Campello, Graham, & Harvey, 2010; Francis, Hasan, & Wang, 2014; Harford, Klasa, & Maxwell, 2014; Kahle & Stulz, 2013).

Based on the diversification argument, conglomerates have better access to internal capital markets, lower costs for the conversion of assets into cash, better investment opportunities, and higher agency costs than firms that are focused on a specific target (Bakke & Gu, 2016; Fernandes & Gonenc, 2016; Subramaniam, Tang, Yue, & Zhou, 2011; Tong, 2011). Hence, diversified firms hold less cash than focused firms over time (Subramaniam et al., 2011) and on average maintain a large and persistent cash differential compared to focused firms from 1990 to 2013 (Bakke & Gu, 2016).

However, Tong (2011) reveals that corporate diversification has a negative impact on the value of cash holdings and a positive effect on holding cash when diversified firms are unconstrained and have a lower level of corporate governance, providing evidence that shareholders attribute lower value to cash holdings, particularly due to the potential inefficiency of spending cash inside these firms.

Cash holdings may also be used for defensive strategies, providing advantages to deter competitors from building capacity ahead of demand, acquiring profitable targets, investing in imminent technologies, or taking advantage of diffuse innovations (Kim & Bettis, 2014; Pinkowitz, Sturgess, & Williamson, 2013;

Qiu & Wan, 2015). In the product market competition context, cash holdings provide financial flexibility for firms facing product market threats (Alimov, 2014; Hoberg, Phillips, & Prabhala, 2014), serve firms with the financial strength for future expansion in market share over their rivals, and avoid predation risk (Fresard, 2010; Haushalter et al., 2007).

The Determinants of Cash Holdings

Understanding the influences on firms to hold cash provides a key insight into the dynamics of cash management and corporate decisions (Azar, Kagy, & Schmalz, 2016). In this regard, identifying the determinants of cash holdings to explain how firms allocate their internal funds was first discussed by Vogel and Maddala (1967), Kim et al. (1998), and Opler et al. (1999). The authors systematically describe the impact on cash-holding behavior of elements such as size, profitability, growth opportunities, cash flow volatility, credit rating, firm value, capital expenditure, acquisition spending, payouts, and access to capital markets.

Following these discussions, the studies of Mikkelsen and Partch (2003), Ferreira and Vilela (2004), Han and Qiu (2007), Bates et al. (2009), Kim and Bettis (2014), Azar et al. (2016), and Beuselinck and Du (2016) examined the variation and the drivers of the recent and persistent increases in average cash holdings.

A growing body of literature has highlighted the relevance of firm-level characteristics in determining corporate cash holdings

behavior, including size (Bigelli & Sánchez-Vidal, 2012; Colquitt, Sommer, & Godwin, 1999; Orens & Reheul, 2013), performance (Deb et al., 2017; Simutin, 2013), profitability (Mun & Jang, 2015), leverage (Anderson & Carverhill, 2012), research & development (Brown & Petersen, 2011; Dittmar et al., 2003; He & Wintoki, 2016), and risk (Acharya et al., 2014; Harford et al., 2014; Palazzo, 2012).

Additionally, studies have explored the relationship between cash holdings and financial crisis (Bliss et al., 2015; Campello et al., 2010, 2011; Davydova & Sokolov, 2014; Nason & Patel, 2016), corruption (Smith, 2016; Thakur & Kannadhasan, 2019; Xu & Li, 2018), GDP growth (Graham & Leary, 2016), creditor rights (Yung & Nafar, 2014), national cultures (Chen, Dou, et al., 2015; Ramírez & Tadesse, 2009), sectors (Bates et al., 2009; Lamont, 1997), institutions, and structures such as banks (Francis et al., 2014; Kahle & Stulz, 2013), unions (Klasa, Maxwell, & Ortiz-Molina, 2009), and governments (Chen, Li, Xiao, & Zou, 2014; Feng & Johansson, 2014; Xu, Chen, Xu, & Chan, 2016).

Cash holdings have also been analyzed as an antecedent factor that influences other corporate financial decisions and strategies such as investment levels (Arslan, Florackis, & Ozkan, 2006; Bakke & Gu, 2016; Bao, Chan, & Zhang, 2012; Song & Lee, 2012), corporate social responsibility (Aroui & Pijourlet, 2015; Cheung, 2016), supplier relationships (Bae & Wang, 2015; Itzkowitz, 2013), acquisitions (Almeida, Campello, & Hackbarth, 2011; Harford, 1999; Lie & Liu, 2017; Pinkowitz

et al., 2013), share repurchases (Haw, Ho, Hu, & Zhang, 2011; Lee & Suh, 2011; Rapp et al., 2014), and payout policy (Koussis, Martzoukos, & Trigeorgis, 2017; Opler et al., 1999).

The Value of Cash Holdings

Corporate cash holdings benefit firms by reducing their dependence on costly external financing and supporting current investment opportunities (Kim et al., 1998). Nonetheless, holding cash and cash equivalents might directly generate two costs: the carrying cost associated with the lower return earned on cash relative to other investments with the same risk level, and the transaction cost related to fees charged on external financing (Azar et al., 2016; Dittmar et al., 2003; Kim et al., 1998). Therefore, understanding the value of cash is relevant to corporate finance (Chi & Su, 2015; Duchin, Gilbert, Harford, & Hrdlicka, 2017; Faulkender & Wang, 2006). Whereas the carrying cost negatively impacts investment opportunities and explains part of the variation in the level of cash holdings (Azar et al., 2016), transactions costs influence firms to hold more cash, particularly because of the inability to access external funding and the marginal cost of cash shortfalls (Bates et al., 2009; Faulkender & Wang, 2006; Miller & Orr, 1966).

In this regard, the value that shareholders place on an extra dollar of cash held by firms has been recently considered as a relevant subject in the corporate finance literature. The key insight is that investors assign a value to cash holdings according to the use of these

Exhibit 5

Paper Goal, Main Conclusions, Contributions, and Limitations

N	Author(s)	Paper Goal	Main Conclusions	Main Contribution	Limitations
1	Acharya et al. (2007)	To study how firms allocate cash flows across their cash and debt accounts	Both firms, constrained and unconstrained, use excess cash flows to reduce the amount of outstanding debt when their hedging needs are low. In this state, a firm has high investment opportunities, thus it may allocate its cash flow toward debt reductions to save/amplify its debt capacity. However, firms will prefer more cash to lower debt if their hedging needs are higher, that is, in a state of low future investment opportunities	To suggest firms have to use cash and debt as hedging tools. Acharya et al. (2007)'s paper is one of the first to operationalize empirically the notion of hedging needs as the key determinant of the firms preferences (hold or not hold cash)	
2	Acharya et al. (2012)	To study the interactions between cash holdings and credit risk from a theoretical framework and empirical test	To suggest firms that have larger cash holdings are associated with higher levels of credit risk	By finding that the correlation between cash and credit risk reverses the sign for periods longer than 1 year the firm becomes positive and statistically significant. That is, higher cash holdings reduce the probability of a cash shortfall; however, they increase the long-term probability of default because higher cash savings require reductions in valuable investments. Consequently, there	

(Continues)

N	Author(s)	Paper Goal	Main Conclusions	Main Contribution	Limitations
3	Acharya and Merrouche (2012)	To examine the effects of banking demand for liquidity on interbank markets before and during the subprime crisis of 2007–2009	Banks during the 2007–2008 crisis that had higher credit and solvency risks hoarded more liquidity as a precautionary response. This raised overnight interbank rates, suggesting a contagion style systemic risk with operating through inter-bank markets	To show the presence of a precautionary demand effect from the positive relationship between interest rate and liquidity demand during the subprime crisis	are no future incremental cash flows to support its business cycle, and the firm can become financially bankrupt
4	Acharya et al. (2013)	To develop a theoretical novel on the trade-offs between cash and credit lines moderated by aggregate risk and liquidity premium	To suggest as aggregate risk increases, firms are more exposed to systematic risks holding more cash and decreasing the demand for credit lines	To complement the theoretical literature by explaining why firms have used pledged sources such as cash and credit lines to manage their liquidity needs	
5	Acharya et al. (2014)	To design a theoretical model of corporate liquidity and empirically test the effect of liquidity risk on credit lines and liquidity management	To characterize cash-based liquidity management, firms tend to invest in illiquid projects. As a result of greater liquidity risk, higher costs for borrowing bank credit lines are required from these firms. Therefore, liquidity riskier firms are likely to rely on cash instead of credit lines for liquidity management. On the contrary, firms with low hedging needs are associated with the probability of using a credit line	By modeling a new identification strategy for liquidity risk tests and hedging needs offer a new insight to the literature addressing the role of credit lines as financial monitors in handling the illiquidity transformation problem	

(Continues)

N	Author(s)	Paper Goal	Main Conclusions	Main Contribution	Limitations
6	Agliardi et al. (2016)	To frame the impact of ambiguity in a firm's equity, debt and cash holdings	Cash holdings become more attractive when the impact of ambiguity aversion bias is large	To model the effects of ambiguity on corporate decisions and cash holdings in a real-option framework	
7	Al-Najjar (2013)	To investigate the effect of capital structure and dividend policy on cash holdings in developing countries such as Brazil, Russia, India, and China and comparing the results with a sample from the United States and the United Kingdom	To show that leverage, dividend payout, profitability, asset liquidity, and firm size have affected corporate cash holdings in both emerging markets and developed countries (United States and United Kingdom). To ascribe the differences among the countries to different industrial and institutional settings as the varied financial decisions into firms	This article is among the first to concentrate on emerging markets (Brazil, Russia, India, and China) and the effect of capital structure and dividend policy on cash holdings	
8	Al-Najjar (2015)	To focus on the relationship among governance mechanisms, ownership, and cash holdings in small and medium-sized enterprises (SMEs) in Britain	To report that cash holdings are affected positively by CEO compensation and R&D and affected negatively by leverage and liquidity. Contrary to the prior literature, growth opportunities, cash flows, and capital expenditures are not related to SMEs cash holdings	To focus on the importance of internal governance mechanisms in cash holding decisions inside SMEs	Despite describing that SME firms have cash holding targets, this article does not display what these targets are or how firms fit these cash reserve levels. The author further exposes that the equal weight methodology adopted to design the governance index might lead to an insignificant relationship in his study. Other restrictions are reserved by the limited availability of financial and governance information for SMEs

(Continues)

N	Author(s)	Paper Goal	Main Conclusions	Main Contribution	Limitations
9	Alimov (2014)	To investigate the interaction among product market competition, trade liberalization, and corporate cash holdings	To point out that trade liberalization leads a positive and causal effects between intensity of market competition and corporate cash holdings	It is the first work to show the influence of product market competition in corporate cash holdings from a quasi-experiment	The findings derived from natural experiments to other settings cannot be generalized
10	Almeida et al. (2004)	To design a liquidity model of cash flow sensitivity of cash that captures the effect of financial constraints on corporate policies	To demonstrate the cash flow sensitivity of cash is close to and not statistically different from zero for the unconstrained firms, but positive and significantly different from zero for the constrained firms. Additionally, constrained firms hold a considerable portion of cash during downturns while unconstrained firms do not display changes in their cash policies	The first paper to pursue the approach of the sensitivity of cash holdings to cash flow on corporate liquidity literature	As pointed out by Han and Qiu (2007), this article do not discuss the firm's precautionary cash holding in response to cash flow uncertainty
11	Almeida and Campello (2010)	To examine the relationship among financial constraints, internal, and external sources of financing	To report a degree of complementarity between internal and external financing funds among financially constrained firms relative to those unconstrained, which might suggest an endogenous connection between investment and financing decisions	To provide evidence that investment and financing decisions might be interdependent	
12	Almeida, Campello, and Hackbarth (2011)	To propose a theoretical relationship among corporate liquidity, asset reallocation, and acquisitions. To examine empirically the role of alternative liquidity instruments in financing acquisitions	Predicting that financially distressed firms are more likely to be acquired by firms in the same industry being more prevalent among asset specificity industry firms and using bank credit lines as a financing mechanism for these acquisitions	To present credit lines as an effective tool to transfer liquidity across states, particularly financing investment opportunities such as acquisitions	

(Continues)

N	Author(s)	Paper Goal	Main Conclusions	Main Contribution	Limitations
13	Almeida, Campello, and Weisbach (2011)	To frame a theoretical novel about how real corporate investment decisions are affected by intertemporal financing frictions	Specifically on cash holding literature, by stating theoretically a positive relationship among financial constraints, cash holdings, and types of investment	To increment the literature by providing a theoretical framework that supports patterns tested previously by empirical works on risk-taking behavior, capital structure choices, hedging strategies, and cash management policies	To cover just a part of the literature on liquidity management remaining silent on issues such as estimates of the value of cash, the asset pricing implications of corporate liquidity, and dynamic models of cash
14	Almeida et al. (2014)	To present a model and a survey of empirical findings on liquidity management, such as the agency based theories of liquidity, the real effects of liquidity choices, and the impact of the 2008–2009 financial crisis on firms' liquidity management	To reinforce the importance of liquidity management research for either modern academic purposes or the financial manager's job. Although the liquidity management literature has addressed several topics, there are other unsolved issues, for example, the increase of ratio of cash over assets in the last years, or the way that firms hold cash or the lack of information about the use of credit lines and derivatives by firms as potential substitute sources of cash	An almost complete survey on liquidity management divided by clustered areas on the field that present a picture of liquidity management literature	
15	Anderson and Carverhill (2012)	To determine dynamically the optimal level of cash holding and leverage policy in a firm with given assets in place and long-term debt outstanding	To describe theoretically that firms have a negative marginal propensity to save cash in higher profitability scenarios independently of their investment projects, whereas lower profitability frames the relationship between investment and cash holdings as they become highly dependent on each other	To shed light on the optimal level of cash holdings as a decreasing function of profitability scenarios	

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N	Author(s)	Paper Goal	Main Conclusions	Main Contribution	Limitations
16	Anderson and Hamadi (2016)	To investigate the effect of ownership structure on cash holdings and how the market values the cash held by Belgian firms	Cash holdings are positively associated with ownership concentration but not related to managerial ownership. High levels of cash holdings are a reflection of a rational strategy by owners who seek value through long-term control	To present that firms target higher levels of cash to maintain control	
17	Andrén and Jankensgård (2015)	To examine the effects of an exogenous and unexpected shock on the investment-cash flow relationship	The financial constraints of small firms became less binding during the 2005–2008 period, although the investment opportunity rates average increased for small firms faster than their operating cash flows	To highlight the changes of investment-cash flow sensitivity to the cost of external financing before and after a substantial and persistent shock in the oil and gas industry between 2000 and 2008	
18	Arnold (2014)	To extend and test a trade-off model of capital structure incorporating corporate cash management and agency conflicts between managers and shareholders	To predict theoretically that managers hold excess amounts of cash to defer default risk by liquidating a debt instead of employing these cash holdings in investment opportunities during economic distress	To aggregate through modeling another insight than agency framework on why managers hold excess cash inside companies. To present only a simulation of this framework	
19	Arouri and Pijourlet (2015)	To investigate how corporate social responsibility performance affects the value of cash holdings	Higher corporate social responsibility performance leads to a higher market value of cash holdings	Higher corporate social responsibility is related to a more efficient use of cash holdings mitigating agency conflicts	
20	Arslan et al. (2006)	To explore the interaction among financing constraints, investment cash-flow sensitivities, and cash holdings in Turkish firms	To suggest cash is a hedging instrument that leads with cash flow fluctuations and fuels investment opportunities. Financially constrained firms hold less cash and display a higher investment cash flow sensitivity than unconstrained firms in the Turkish context	To present a view that cash holdings might be a proxy for financial constraints	

(Continues)

N	Author(s)	Paper Goal	Main Conclusions	Main Contribution	Limitations
21	Azar et al. (2016)	To examine how changes in the cost of carry explain the dynamics of liquid-assets holdings in the U.S. firms and abroad from 1945 to 2013	The variation in the cost of carry drives changes over time in the dynamics and level of corporate cash holdings, both in the United States and abroad	To show that current U.S. cash holdings are similar in the context of a long-term historical and an international perspective	To not include firm-level factors that could affect the cost and benefit of holding cash
22	Bakke and Gu (2016)	To examine the relationship among investment, cash savings, and diversification decisions using a dynamic model	Cash holdings decrease when firms diversify and efficient internal capital reduces the need to retain cash in conglomerate firms	To study the cash differences between diversified and focused firms and to investigate the reallocation of resources through internal capital markets	
23	Baldenius (2006)	To frame theoretical insight and to explore how agency relationships affect corporate cash decisions inside vertically integrated firms	To present insight that ownership affects managers' behavior in vertically integrated firms, alleviating cash hold-up and underinvestment problems	To lay on vertical integration settings showing how compensation design varies across organizational strategies and can influence firm performance and cash holdings	
24	Bao et al. (2012)	To examine the relationship between the cash flow sensitivity of cash and cash flow environment faced by the firm (negative or positive)	Firms have different levels of responses to their cash holdings when facing positive and negative cash flows. Further, to identify that constrained firms facing profit shocks need to save money and must cease to invest in new projects	To display a nonlinear perspective on cash flow sensitivity of cash, meaning firms respond asymmetrically to their cash holdings as they face different cash flow environments	
25	Bates et al. (2009)	To investigate the causes of U.S. firms holding more cash than they used to	To identify a significant increase in the cash holdings and decrease in net debt of U.S. firms from 1980 to 2006. To pinpoint this increase being driven by precautionary savings,	To document a broad comparative view on why different types of American corporations have maintained more cash than they effectively need	Data requirements limit the size of sample in Bates et al. (2009)'s paper

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N	Author(s)	Paper Goal	Main Conclusions	Main Contribution	Limitations
26	Beuselinck and Du (2016)	To examine the determinants of cash holdings in Chinese subsidiaries of U.S. multinational corporations	<p>especially into industries with higher idiosyncratic risk and those that do not pay dividends, but are not influenced by agency conflicts</p> <p>Multinational corporations reserve cash in foreign subsidiaries with innovation and knowledge transfer capabilities</p>	Highlighting the relevance of subsidiary boards and expatriate CEOs in monitoring and controlling foreign subsidiaries to avoid the potential expropriation risk of foreign cash holdings	
27	Bigelli and Sánchez-Vidal (2012)	To study the determinants of corporate cash holdings in private Italian firms	Smaller, riskier, higher financing deficits, and younger Italian firms tend to hold more cash reserves and less noncash components (such as bank debt and net working capital) than the other firms (larger and richer companies)	To contribute to the literature on cash holding by analyzing the determinants of cash holdings in Italian private firms	
28	Bliss et al. (2015)	To study if firms adjust their corporate payout policy, investment, and cash retention before and during the subprime crisis	Firms reduce payout ratios and share repurchases to increase cash reserves or to fund corporate investment during the 2008–2009 crisis period	To show that firms use payout reductions as a substitute financing source when the cost of external financing increases over the crisis period	
29	Boileau and Moyen (2016)	To analyze the mechanisms behind the rise in corporate liquidities since the 1970s	A large increase in cash holdings and widespread credit line use are due to the change in a firm's volatility and consequently its higher liquidity needs	To reinforce motives for holding cash, such as precautionary and liquidity reasons	To not explore the factors that have driven the changes in firms' compositions over time and how these mechanisms may be connected to cash holdings and credit line usage

(Continues)

N	Author(s)	Paper Goal	Main Conclusions	Main Contribution	Limitations
30	Boutin et al. (2013)	To study the relationship between internal capital markets operating within business groups and entrant firms into the market	Firms from financially strong business groups have their entry into the market facilitated because they are supported by internal capital markets provided by other affiliated firms	This is the first paper to empirically assess the impact of business group cash holdings on product market competition. To set up a unique dataset allowing new conclusions on French business groups to be reached	
31	Breuer et al. (2016)	To investigate the relationship between investor preferences and cash management	The value of cash and the amount of cash holdings depend on the investor's preference and if a firm is financially constrained	By attaching investors' behavior toward ambiguous investment returns to cash management decisions	
32	Brisker et al. (2013)	To analyze if the addition to S&P 500 Index affects a firm's liquidity policy, specifically in cash holdings management	Firms tend to hold on average 7% less cash after the inclusion into the S&P 500 Index, while firms in the top-size-decile of Compustat increase their cash holdings over time	This is the first paper to document that the cash holding policy of a firm is affected by inclusion into the S&P 500 Index	The empirical support of the declining investment opportunities hypothesis can be explained by other issues, such as the increase of acquisitions found by the authors into indexed firms
33	Brown and Petersen (2011)	To examine the role of corporate cash holdings on R&D investments during finance shocks	Younger firms facing financing constraints rely on cash holdings to buffer their R&D flows from financial downturns	To provide insights on the importance of cash holdings to R&D-intensive firms, especially for younger companies	
34	Cabello (2017)	To propose a new methodology that finds the optimal level of cash and improves cash management at branch level in the banking industry	To show the main conditions necessary for banks to ensure optimal cash holdings and efficient cash management	To provide a branch-level cash holdings model for the banking industry to minimize the risk of bankruptcy in long-term projections	
35	Campello et al. (2010)	To develop a survey-based measure of financial constraint that identifies cross-sectional variations in	Constrained firms reported plans of cutting more spending in employment (by 11%), technology (by 22%), capital investment	To contribute with a new perspective on real corporate decisions and financial constraints by surveying CFOs of	The authors are concerned that uncontrolled firms' heterogeneity may confound their inferences. The authors

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N	Author(s)	Paper Goal	Main Conclusions	Main Contribution	Limitations
		<p>liquidity and spending plans for public and private firms around the world during the 2008 crisis</p>	<p>(by 9%), and dividend payments (by 14%) in 2009. Firms facing financial constraints hold more cash to protect themselves from financial downturns than unconstrained peers</p>	<p>firms around the world during the 2008 financial crisis</p>	<p>also emphasize that research based on surveys may be compromised if questions are misunderstood by the audience</p>
36	<p>Campello et al. (2011)</p>	<p>To investigate the interaction between internal and external sources of liquidity on corporate decisions, such as investment, technology, and employment expenditures during the financial 2008–2009 crisis</p>	<p>To display that smaller, private, non-investment grade, and unprofitable firms draw significantly larger amounts of funds under their line facilities than their larger, public, investment-grade, and profitable counterparts. Further, by exposing the substitution effects of internal funds to the external ones during the crisis</p>	<p>To lay on the role of draw-down activity and the dynamics of covenant violations on corporate management liquidity. By deeply analyzing the influence of liquidity on corporate real decisions, the authors shed light on how liquidity management and real-side decisions are interconnected</p>	<p>This article is limited on one cross section of firms. By using surveys to gather previous information from corporate managers, “it is still possible that some of the questions were misunderstood or otherwise produce noisy measures of the variables of interest”</p>
37	<p>Chen (2008)</p>	<p>To study the influence of governance on corporate cash holding policies in listed new economy and old economy firms</p>	<p>Listed new economy and old economy behave differently regarding the interaction between cash holdings and corporate governance. Firms with higher board independence hold more cash than their counterparts for risk-aversion reasons and investment opportunities</p>	<p>This article is the first to distinguish the effects of corporate governance on cash holdings in listed new economy and old economy firms</p>	<p>The main limitations pointed out by the authors are the study sample and the measurement of antitakeover index</p>
38	<p>Chen and Chuang (2009)</p>	<p>To analyze the interaction between corporate cash holdings and governance mechanisms in high-tech firms</p>	<p>CEO ownership, VC directors, and independent directors positively affect corporate cash holdings</p>	<p>By showing the effects of corporate governance on corporate cash holdings are different between high-tech and non-high-tech firms, especially in cases where venture capitalists (VCs) and founders play roles in their governance mechanisms</p>	

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N	Author(s)	Paper Goal	Main Conclusions	Main Contribution	Limitations
39	Chen et al. (2012)	To shape the sensitivity of cash holdings from corporate governance inside Chinese firms	Using the 2005 share reform, this article shows corporate cash holding decreased from 23.5% of noncash assets to 20.8% of noncash assets after the reform, particularly in firms with weaker corporate governance and tighter financial constraints	To present the change of corporate cash holding behavior after a share reform in 2005 and its relationship with corporate governance and financial constraints	
40	Chen et al. (2014)	To analyze the effects of government quality on cash holdings in China	Chen et al. (2014) present evidence that government quality is negatively related to corporate cash holdings in firms facing financial constraints. Moreover, Chen et al. (2014) find that a better quality of government boosts firms' access to bank loans and trade credit, reducing financial constraints, and allowing less cash holdings by private local firms in China	Chen et al. (2014) combine law and finance literature to demonstrate the way government quality might mitigate financial constraints and reduce the level of cash holdings of firms in China	
41	Chen, Dou, et al. (2015)	To evaluate the impacts of national cultural dimensions (individualism and uncertainty avoidance) on corporate cash holdings around the world	Higher individualism index country-firms or lower uncertainty avoidance index country-firms retain less cash than their counterpart groups. Moreover, higher individualism rated firms tend to invest more in capital expenditures, acquisitions, and repurchases, yet they spend less on dividend payments. Firms in higher uncertainty avoidance index countries reserve more cash but do not engage in repurchases	By relying on distinct literatures from corporate cash holdings, cross-cultural psychology, and behavioral finance to present in first-hand the effects of national culture on corporate decisions, particularly on cash holding policy	Even though emphasizing excess cash reserves could induce managers to spend money in acquisitions, capital expenditures, and repurchases, this article does not specify the features of this type of spending inside firms such as the quality or risk level of corporate investment

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N	Author(s)	Paper Goal	Main Conclusions	Main Contribution	Limitations
42	Chen, Harford, and Lin (2015)	To examine the effects of analyst coverage on mitigating agency conflicts from brokerage closures and brokerage mergers	Managers of firms that experience an exogenous decrease in analyst coverage are more likely to misuse cash reserves, make value-destroying acquisitions, and engage in earnings management activities	To disclose the monitoring role that financial analysts play in mitigating agency problems between managers and outside shareholders	
43	Cheung (2016)	To explore the relation between corporate social responsibility and cash holdings	Corporate social responsibility is positively and significantly correlated with corporate cash holdings from 1991 to 2011	By identifying first-hand that corporate social responsibility affects cash holdings through the channels of systematic risk, idiosyncratic risk, and corporate governance	
44	Colquitt et al. (1999)	To investigate the variation in cash holdings among American property-liability insurers from 1993 to 1995	Smaller insurance firms, insurers with shorter-tail liability durations, riskier cash flows, and greater future investment opportunities hoard more cash for liquidity needs. On the other hand, mutual insurers, larger insurance companies, insurers with higher best's ratings, and highly levered insurers sustain less cash for accessing more easily alternative financial resources	By approaching the main differences in cash holdings across insurance firms in the United States	
45	Core et al. (2006)	To study if growth opportunities, monitoring, and agency problems are determinants in explaining why not-for-profit firms have persistent cash holdings over time	Excess endowments are negatively related to growth opportunities and positively related to CEO compensation. However, firms that hold more cash are more likely to be less efficient, which suggests the presence of agency conflicts	Researching cash holdings on the unexplored context of not-for-profit firms and reporting endowment holdings by not-for-profit firms are, on average, larger than cash holdings by for-profit firms	

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N	Author(s)	Paper Goal	Main Conclusions	Main Contribution	Limitations
46	Custódio and Metzger (2014)	To analyze the relationship between CEOs' work experience and corporate financial policies	Nonfinancial firms with financial expert CEOs on average have lower cash holdings (by 12% less), a higher leverage ratio (by 6% more), higher repurchase shares (by 7% more) and lower investment-to-cash flow sensitivity. Furthermore, financial expert CEOs have better communication with other organizations and better access to external financial funds	To present an interesting connection between firms with financial expert CEOs and corporate financial policies	Despite using exogenous variables, the endogenous matching between CEOs and firms based on time-varying characteristics in this article might have led to biased results
47	Deb et al. (2017)	To evaluate if and when cash creates shareholder value and enhances firm performance	Cash enhances firm performance when firms operate in industries that are highly competitive, research-intensive, or characterized by high growth. However, in contexts where firms are poorly governed, more diversified or more opaque to outside investors, cash and performance are negatively related	To highlight the relevance of contextual moderators such as industry competition, industry R&D intensity, industry growth, corporate governance, diversification, and corporate opacity in determining the cash-performance relationship	
48	Décamps et al. (2011)	To propose a dynamic model settling the linkage among corporate cash holdings, dividend payments, new equity issuances and market frictions	To develop a stylized continuous-time model of a firm facing internal agency costs and external financing costs. To show how market imperfections influence corporate cash holdings, payout policies, new equity issuances, and stock prices	To offer a new theoretical insight highlighting how corporate cash holding is affected by market frictions and its repercussions on risk management and dividend policies as well as on cash flows and stock price dynamics	
49	Denis and Sibilkov (2010)	To explore why cash holdings are more valuable for	Constrained firms hold more cash for precautionary savings. Furthermore, there is	To present the reasons that constrained firms generally	

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N	Author(s)	Paper Goal	Main Conclusions	Main Contribution	Limitations
		constrained firms than unconstrained peers	hierarchical cash holding behavior among constrained firms. In this sense, lower cash costs of external financing hold less cash than higher cash constrained ones, particularly because the former firms produce lower cash flow than the latter	hold more cash than unconstrained ones	
50	Denis (2011)	To provide an overview on studies of the determinants and consequences of corporate cash holdings, costly external finances, financial flexibility, and liquidity management	Several studies have pointed out financial flexibility as an important component of corporate financial policies	To review main theories and empirical evidences that firms manage financial flexibility through the management of corporate liquidity, capital structure, and payout policies	
51	Disatnik et al. (2013)	To model and test the interaction between corporate hedging and liquidity policies	Cash flow hedging reduces the firm's need for holding cash and allows it to rely more on bank lines of credit	To highlight the importance of studying the firm's choice of hedging, cash holdings, and lines of credit as interrelated corporate policies	
52	Dittmar et al. (2003)	To examine the influence of corporate governance on cash holdings in firms throughout the world in 1998	Firms with higher market-to-book ratios, higher R&D expenditures, higher profitability, and smaller size save more cash than their counterparts. Firms inside countries with more developed financial markets and the lowest level of shareholder protection hold more cash than firms settled in other countries	To emphasize the role of corporate governance on cash reserves held by firms around the world imputing to agency conflicts the central reason for these cash stockpiles	The variable of insider agency problems measured by country-level family control is limited by the availability of data

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N	Author(s)	Paper Goal	Main Conclusions	Main Contribution	Limitations
53	Dittmar and Mahrt-Smith (2007)	To propose analyzing the influence of cash holdings and corporate governance on market firm value	To point out that poorly governed firms hoard approximately twice as much of the market value of excess cash than firms that are well governed, further suggesting that these extra cash reserves are being wasted by potentially entrenched managers engaging firms in poor operating performance over time	To reinforce that poorly governed firms hold more cash, experience lower operating performance, and spend their cash excess quickly on inefficient investment projects	
54	D'Mello et al. (2008)	To examine from the setting of a spin-off the forward factors that determine cash holding policies and decisions, especially the initial cash allocation around a new company	To provide evidence that the cash ratio is negatively correlated with size and leverage and positively related to rated debt in spin-offs. Furthermore, to find that cash allocation in a spin-off is not affected by market-to-book ratio, capital expenditures, and financial distress costs	To address their focus on the setting of a spin-off	This article does not present an explanation of why the cash ratio is not affected by financial distress costs but is, at same time, very relevant to the ability of firms to access external capital for their cash allocation decision
55	Doidge and Dyck (2015)	To analyze the impact of a tax policy on corporate finance policies such as cash holdings, investment, financing, and payout in Canadian publicly traded firms	Firms increase leverage, cash holdings, and investment level but reduce payout after tax incentives in Canada	Firms tend to alter corporate policies in response to tax shifts and incentives	
56	Drobetz et al. (2010)	To evaluate the dynamic effect of asymmetry information on corporate cash holdings over time throughout the world	To identify that the marginal value of cash holdings is negatively related to asymmetry information measured by dispersion of analysts' earnings forecasts	To associate the marginal value of cash holdings with the presence of information asymmetry inside firms over time	

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N	Author(s)	Paper Goal	Main Conclusions	Main Contribution	Limitations
57	Duchin (2010)	To debate the linkage between liquidity management and corporate diversification, exploring the influence of investment risk opportunities on corporate cash holdings	Firms with cross-divisional diversification hold less cash to efficiently spend their cash flows on better investment opportunities and to be less exposed to investment risks. Firms that are less diversified in their cash flows and investment opportunities face more investment risk and hold more cash for precautionary savings	To highlight the role of cash reserves in decreasing corporate exposure to the investment risks of multi-divisional firms	
58	Dudley and Zhang (2016)	To examine the relationship between the level of trust in a country and corporate cash holdings	Firms in high-trust countries hold more cash than in low-trust countries, especially because of shareholders' beliefs about corporate insiders' behavior	Societal trust is identified as an important determinant of corporate cash and payout policies	
59	Faff et al. (2016)	To investigate whether corporate investment, financing, and cash policies are interdependent with the firm life cycle	Corporate leverage and cash holdings are greater as firms move from the introduction phase to the mature phase while investment and equity issuance decrease as firms move toward the latter portion of their life cycles	To show that life cycle is an important determinant of corporate policies such as investment, financing, and liquidity	
60	Faleye (2004)	To study the relationship between takeover-deterrence effects of excess cash holdings and a control mechanism called a proxy contest	To suggest that firms that hold excess cash are more likely to become targets of a proxy fight. Moreover, managerial ownership reduces the probability of a proxy contest, whereas outside block ownership marginally increases its likelihood of occurrence	To provide evidence of the role of proxy fights in dealing with specific agency issues and management's control of the firm	The author reports that although proxy fights have raised corporate management's control and are considered effective, there is scarce data about this tool for advanced research

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N	Author(s)	Paper Goal	Main Conclusions	Main Contribution	Limitations
61	Faulkender and Wang (2006)	To examine the value of additional cash on capital structure under conditions of financial friction	The marginal value of cash is higher for constrained firms that have valuable investment opportunities and lower cash holdings than unconstrained companies	To analyze the relationship among marginal value of cash, changes in corporate liquidity, capital structure, and accessibility of external financing	
62	Feng and Johansson (2014)	To approach the effect of the risk of political extraction on corporate cash holdings in Chinese firms	Firms with private entrepreneurs who have connections with politicians have lower cash holdings than their counterparts. As a result, the former firms might have a competitive advantage and prevent the risk of political extraction	To show that politician participation in Chinese private firms is positively correlated with corporate cash behavior and firm value	
63	Fernandes and Gonenc (2016)	To investigate whether geographic diversification influences corporate cash holdings	Multinational companies with higher internationalization and industry diversification might reduce their average cash holdings. However, multinationalism and industry diversification play different roles on cash holdings in countries with stronger legal protection of investors, higher GDP growth, less individualism, and high uncertainty avoidance	To identify that there are economies of scale in cash management in multinational companies, and diversification might explain several patterns of cash holdings around the world	
64	Fritz Foley et al. (2007)	To investigate the relationship between corporate cash holdings and repatriation taxes	To present that U.S. multinational firms in countries with low tax rates and technology-intensive firms retain more cash, yet firms facing financial constraints hold less cash	To present the potential impact of repatriation taxes on corporate cash holdings	

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N	Author(s)	Paper Goal	Main Conclusions	Main Contribution	Limitations
65	Francis et al. (2014)	To test if banking deregulation influences corporate cash policies in U.S. firms	To assess the fact that banking deregulation negatively affects the level of liquid assets held by U.S. firms. This effect might be ascribed to financially constrained firms with different hedging needs	This is the first paper to investigate the response of corporate cash policies to changes in banking deregulation and consolidation	This article does not discern the impact of competitiveness on cash holdings or the investor influence on excess of cash reserves
66	Fresard (2010)	To study the impact of cash holdings on product market behavior regarding firm performance	Cash holdings have a positive impact on corporate market share expansion and firm performance, particularly in firms experiencing exogenous unexpected changes in product market competition and weaker financial positions	To supply evidence that firms in highly competitive industry environments and with financing access constraints tend to hold more cash than other industry groups	This article does not provide a complete explanation about the premium that investors place on the excess cash of cross-listed firms. The authors assume that it could have alternative effects on the relationship among better external monitoring tools, private benefit decrease, and cash reserve behavior
67	Frésard and Salva (2010)	To study how corporate governance mechanisms can mitigate potential managerial private benefits related to corporate cash holding behavior around the world	To display that U.S. cross-listings boost corporate governance mechanisms bounding insiders' actions and preventing these insiders from extracting private benefits from corporate cash holdings	To show the influence of the implementation of corporate governance mechanisms from U.S. cross-listings on cash holding behavior by firms' insiders	This article does not provide a complete explanation about the premium that investors place on the excess cash of cross-listed firms. The authors assume that it could have alternative effects on the relationship among better external monitoring tools, private benefit decrease, and cash reserve behavior
68	Fresard (2011)	To explore the connection between corporate cash savings and the informativeness of stock prices	To suggest that corporate cash holdings are more sensitive to stock price as firm-specific return variation becomes higher. Indeed, this firm-specific return variation unexplained by market and	Focusing on the relationship among information managerial learning, the stock market, and corporate cash holding behavior emphasizes the informational role played by stock price in changing	

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<i>N</i>	<i>Author(s)</i>	<i>Paper Goal</i>	<i>Main Conclusions</i>	<i>Main Contribution</i>	<i>Limitations</i>
69	Gamba and Triantis (2008)	To design a dynamic structural model of the interplay between liquidity management and financial flexibility at the firm level	Industry movements provides new information to investors that is not available to managers, positively influencing their cash saving decisions from stock market learning The marginal value of liquidity is negatively related to liquidity and positively correlated with investment opportunities and financial constraints. Additionally, to show that as a firm faces high costs of external financing, it might hold more cash to boost its internal resource savings and invest in new investment opportunities	the amount of cash that is saved by firms' managers To provide evidence that internal liquidity is a relevant source of financial flexibility, especially because these internal funds can mitigate financial friction problems	
70	Gao (2011)	To address the adverse selection effect of corporate cash holdings from acquisition transactions	The excess of cash holdings has a strong and negative informational effect on stock prices, reaching the worst price reaction in the acquisition announcement Private firms hold less cash than public firms, which may be due to reduced agency problems and an increase of financing frictions for the former	To point out that excess cash holdings lead to an adverse selection effect on stock prices for signaling an over-valuation when issuance financing is employed	
71	Gao et al. (2013)	To explore the determinants of cash holding policies in private and public U.S. firms		This is the first paper to employ a large sample of American firms, both private and public, to grasp and compare the determinants of corporate cash holdings, as well as to assess the effects of agency costs on their cash reserves	

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N	Author(s)	Paper Goal	Main Conclusions	Main Contribution	Limitations
72	Gao and Jia (2015)	To examine whether internal control affects stockholders' perspectives on the value of cash holdings	The market value of cash holdings for firms with weaker internal control is lower than that of firms without weak internal control	To document real effects of internal control on corporate resources and its important role as an instrument of governance inside firms	
73	Ghaly et al. (2015)	To test if firms accumulate cash to provide and improve employee welfare benefits	Firms that invest in employee-friendly practices are likely to hold cash, especially in highly competitive industries and human-capital-intensive firms	To provide evidence of the roles human capital and employee relations play in a firm's cash management policy	
74	Gore (2009)	To identify the determinants and consequences of cash holding in American municipal contexts	Governments with a higher variation in revenues, lower state revenues, and higher growth accumulate more cash than their counterpart municipalities	To explore the determinants and effects of cash holdings in government contexts	
75	Gryglewicz (2011)	To model the role of corporate liquidity and solvency risks on corporate cash and dividends policies, as well as structure choice, valuation and credit spreads	A larger liquidity risk requires larger cash reserves, and higher solvency risks suggest lower cash holdings by firms	To show the interplay among corporate liquidity, solvency, cash holdings, dividends, capital structure choice, valuation, and credit spreads	
76	Han and Qiu (2007)	To frame a theoretical model of interaction between corporate cash holdings, cash flow uncertainty, and financial constraints from a corporate precautionary cash holding perspective	To show that financially constrained firms hold more cash for precautionary savings as the volatility of cash flows increases, whereas this relationship has no significant effect on unconstrained firms	This is the first paper to study the relationship among corporate cash holdings, cash flow uncertainty, and financial constraints	
77	Hansen and Wagner (2017)	To examine the cash flow sensitivities of cash and investment in copper mining firms	The results show a positive and statistically significant cash flow sensitivity of cash, but a statistically insignificant cash flow sensitivity of investment in copper mining firms	To support that firms hold cash as buffer stock to undertake future investment opportunities	

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N	Author(s)	Paper Goal	Main Conclusions	Main Contribution	Limitations
78	Harford (1999)	To examine if managers from cash-rich firms have engaged in value-decreasing acquisitions	Cash-rich, large firms and firms with abnormal returns and higher sales growth are likely to become unexpected bidders. Nonetheless, these unexpected acquisitions tend to bid on unattractive and/or diversifying targets with high costs and low transaction benefits, leading to the destruction of the shareholder value	This is the first paper to methodically investigate the use of cash reserves in acquisitions. The smaller sample size of insider ownership may have affected the paper's results	
79	Harford et al. (2008)	To assess how corporate governance influences a firm's cash stockpile management	Firms with higher insider ownership, stronger investor protection, and higher likelihood to become bidders hold more cash than other groups	By presenting that more weakly governed firms are likely to hold less cash, this article identifies an opposite trend relative to prior literature. Furthermore, it sheds light on the understanding of how country-level shareholder rights can interplay with firm-level agency problems and shareholder power	
80	Harford et al. (2014)	To study if corporate decisions on cash holding and debt maturity alleviate their refinancing risk	Firms with shorter maturity debt hold more cash to avoid refinancing risk and its related costs	To highlight maturity debt and refinancing risk as important determinants of corporate cash holdings over time	
81	Haushalter et al. (2007)	To investigate the relationship between predation risk and corporate financial policies	Predation risk is more likely to occur in oligopolistic industries and technological core companies given their greater interdependence in investment opportunities with product market rivals. Furthermore, firms with higher investment opportunities	To present the linkage among market competition, investment strategy, and corporate cash holdings, showing how firms react as a result of probability of predation risk	Is the value of cash holdings conditional on competitive interdependencies and industry structures?

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N	Author(s)	Paper Goal	Main Conclusions	Main Contribution	Limitations
82	Haw et al. (2011)	To examine the effect of share repurchases on firm value and corporate cash holdings around the world	have higher predation risk, hold more cash, and use derivatives aiming to decrease the predation by cash-rich companies and gain market share on these rival groups, especially during economic downturns To reveal that the higher marginal value of cash is positively associated with investor protection	To support that tax effects and agency costs play a relevant role in determining the marginal value of cash	
83	He and Wintoki (2016)	To study how and to what extent R&D investment explains the cash holdings of U.S. firms in the past three decades	R&D investments are able to explain more than 20% of the increase in aggregate cash holdings of U.S. firms from 1980 to 2012. Furthermore, R&D-intensive industries have become more sensitive to the effect of competition on their cash management policies	To identify the effect of R&D investments on the secular increase in cash holding behavior in U.S. firms over the last three decades	
84	Hoberg et al. (2014)	To examine the influence of the product market on firm payout and corporate cash holding policies	To address that firms in more competitive markets tend to have higher cash balances, pay fewer dividends, and repurchase fewer shares than their rival counterparts	To capture the fluidity and dynamics that some product markets have over time, explaining the corporate policy behavior beyond static cross-sectional measures of competition	
85	Holmström and Tirole (1998)	To provide theoretical insight into how firms provide future liquidity needs	To state that liquidity shocks might cause firms to hold reserves as a way of arranging external financing in the future and as an alternative to preventing liquidity risk	Using a unified model of moral hazard in a financial demand context, to shed light on the way that firms project their liquidity needs (e.g., cash holdings and credit lines) under liquidity shocks	The authors point out that intermediaries play a passive role in their model, recognizing the importance of studying their performance in monitoring investments and liquidity needs

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N	Author(s)	Paper Goal	Main Conclusions	Main Contribution	Limitations
86	Hsu et al. (2014)	To explore the impact of corporate governance on cash holdings in the U.S. property-liability insurance industry	Independent board and finance committee members play a monitoring role in managers' cash spending behavior in a regulated industry, preventing underinvestment problems, and monitoring agency costs of excess cash holdings	To supply evidence for regulators, managers, policyholders, and investors that board characteristics may maximize stakeholders' wealth	
87	Huang and Wang (2009)	To investigate if the level of corporate investment and cash holding behavior influence firms' equity returns	Cash holdings increase the future return on physical capital and firm stocks	To emphasize the importance of cash reserves on corporate investment and expected stock returns, displaying that cash-richer firms tend to have lower levels of physical assets and generate higher expected returns for precautionary savings and lower future external financing costs	
88	Huang et al. (2013)	To study the relationship between investor protections and firms' levels of cash holdings around the world	Stronger investor protection settings associated with straightforward accounting standards are positively correlated with corporate cash holdings	To debate the relevance of shareholder protection to corporate cash holding policies	
89	Huang et al. (2015)	To evaluate the value of cash holdings for firms that face external financing costs as well as nontrivial expropriation risks	Firms that have ineffective internal control over financing reporting tend to have stronger precautionary benefits and higher agency costs of carrying cash than those that present effective internal control over financing reporting	The value of an additional dollar of cash is higher for those with ineffective internal controls over financing reports than their counterparts	

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Cash reserves

N	Author(s)	Paper Goal	Main Conclusions	Main Contribution	Limitations
90	Hugonnier et al. (2014)	To model the impacts of capital supply frictions on corporate financial policies	Target cash holdings increase as cash flow volatility increases and decrease as agency conflicts arise inside firms	To model a theoretical method incorporating corporate financing, investment and liquidity policy behavior under capital supply frictions	
91	Iskandar-Datta and Jia (2012)	To present the driving forces underlying the cash pattern in the 1991–2008 period around the world	The upward cash trend is not uniform across developed countries	Different reasons such as shareholder rights, capital system orientation, and the development of financial markets drive the upward trend of cash holdings among developed countries	
92	Itzkowitz (2013)	To examine how buyer–supplier interaction affects corporate cash holding management	Buyer–supplier relationships with higher sales concentration imply higher cash holdings by suppliers over time, particularly due to the increase of financial distress risk that comes from these interactions	To expose the role of buyer–supplier relationships on firms' cash holding policies, showing the positive influence these synergies have on corporate cash reserves	
93	Jain et al. (2013)	To assess the linkage among CEO governance heterogeneity, power structure, product market competition, and corporate cash holdings in IPO firms over time	Stronger internal corporate governance mechanisms are positively associated with higher post-IPO cash holdings, especially in competitive product markets	To reinforce that corporate governance, ownership, and market competition might wield a strong positive influence on the level, marginal value and uses of post-IPO cash reserves	
94	Jiang and Lie (2016)	To examine the speed at which firms adjust cash ratios toward target cash levels	Firms close about 31% of the gap between their cash ratios and target cash levels	To suggest that the changes in cash adjustment speeds are consistent with the transaction costs argument and the willingness of self-interested managers perspective	

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N	Author(s)	Paper Goal	Main Conclusions	Main Contribution	Limitations
95	Kahle and Stulz (2013)	To investigate the impact of credit supply shock from the 2008 crisis on capital expenditures, debt issuance, equity issuance, and cash holdings	Unlevered firms experienced a subsequent decrease of 39% of capital expenditures due to the bankruptcy of Lehman's bank, and bank-dependent firms increased their cash holdings significantly during the crisis period	To strengthen the role of a credit supply shock on corporate financial and investment policies during the 2008 crisis	
96	Kalcheva and Lins (2007)	To analyze the impact of managerial control rights on net costs and benefits of cash holdings	Controlling managers tend to hold more cash and pay higher payouts in weaker country-level external shareholder protection. As a result, these two conditions, higher cash reserves and weak investor protection environment, also induce a lower level of firm value	To show that the combination of weak country-level shareholder protection, expected managerial agency conflicts, and higher cash holding levels negatively impacts firm value around the world	
97	Kim et al. (1998)	To design and test a model of optimal corporate investment in liquidity on the trade-off among liquid asset holdings, investment opportunities, and future firm liquidity needs	Firms facing uncertain future internal funds, costly external financing access, and market imperfections are likely to invest in liquid assets as an optimal response to finance future investment opportunities	To establish that firms establish their optimal amount of liquidity according to the cost of external funds, the variance of expected cash flows, and investment opportunity profitability these companies will face in the future	
98	Kim and Bettis (2014)	To assess the relationship between firm performance and corporate cash holdings	Firms with higher R&D, capital expenditures, sales growth rate, and leverage contribute to higher firm performance, measured by Tobin's Q. Further, larger firms tend to retain higher cash holdings as a strategic valuable resource for market competition	To present a strategic view about the influence of cash holdings on firm performance	

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N	Author(s)	Paper Goal	Main Conclusions	Main Contribution	Limitations
99	Kisser (2013)	To model and test the real option value of cash based on a trade-off between agency costs and external financing costs	Cash retention may lead firms to postpone investment to save on external financing costs	To test empirical models on the impact of optimal cash retention on corporate dividend and investment policies in the presence of agency and external financing costs	
100	Klasa et al. (2009)	To examine whether the firm-level unionization ratio influences the level of cash holdings by U.S. manufacturing firms	Firms with less union bargaining power reserve larger cash holdings than other corresponding firms. Moreover, the negative interaction between unionization ratio and corporate cash holdings is more pronounced in higher concentrated industries	To highlight the negative impact of unionization on corporate cash holdings in a collective bargaining setting	
101	Koussis et al. (2017)	To develop a theoretical framework of real options that incorporates growth options, corporate liquidity, dividend policy, default risk, and costly external financing under revenue uncertainty	Dividend policy irrelevancy depends on the absence of default risk and costs of external financing. The model shows the relevance of retained earnings to the presence of growth opportunities and debt financing	To provide testable implications and predictions for further empirical works related to investment, financing, and dividend policy	
102	Kuan et al. (2011)	To study whether the effect of corporate governance on cash holdings in family-controlled firms differs from that in nonfamily controlled firms in Taiwan from 1997 to 2008	Shareholders of family-controlled firms with greater board independence are likely to hold more cash for their operating strategy than their nonfamily controlled counterparts. On the other hand, family-controlled firms with a higher pledge rate tend to hold less cash due to an increase in agency conflicts that come from higher director-ownership-in-pledge whereas the pledge rate shows no effect in nonfamily controlled firms	To display that a higher separation of board seat rights tends to increase cash holdings in low-cash-holding family-controlled firms, but reduces cash holdings in high-cash-holding family-controlled firms in Taiwan	

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N	Author(s)	Paper Goal	Main Conclusions	Main Contribution	Limitations
103	Kusnadi and Wei (2011)	To analyze the influence of the system of investor protection on corporate cash policies in 39 countries from 1995 to 2004	Firms in weaker legal investor protection systems reserve less cash than their counterparts	To emphasize the role of the investor protection environment on international corporate cash management behavior	The assertion that firms with strong systems of investor protection are more likely to decrease their cash holdings due to an increase in cash flow is not supported for strength arguments inside the paper supported
104	Kusnadi et al. (2015)	To study how institutional development and state ownership influence corporate cash holdings among Chinese firms	Institutional development and corporate cash holdings are positively related, this effect being more prominent for non-state-controlled firms	To identify that Chinese legal systems and corporate disclosure and transparency require wide reform to minimize the problem of political extraction and to allow better capital allocation decisions inside firms	
105	Lamont (1997)	To test if large cash flow/collateral value decreases to a corporation's oil segment promoted a decrease in investment in its non-oil segment	The empirical tests show oil companies significantly reduced their non-oil investment in 1986	To discuss why diversified companies tend to subsidize and overinvest in poorly performing segments	Segment-level accounting data may contain more noise than firm-level accounting data. Moreover, this article could not separate the effect of the oil crisis from other events
106	Larkin (2013)	To investigate the role of a firm's brand on financial policy regarding expected cash flow volatility, performance, credit riskiness, leverage, and cash holdings	Stronger brand perception is negatively related to volatility of expected cash flows, increasing the probability of lower future financial friction level, and lower cash holdings	To shed light on the performance of intangible assets on corporate liquidity, firm risk, and corporate financial structure	
107	Lee and Suh (2011)	To explore the effects of corporate cash holdings on share repurchase behavior in seven leading countries—Australia,	To identify evidence that repurchasing firms hold more excess cash for at least two purposes: to reduce the value	To expose the sources that impact share repurchase behavior inside firms across countries over time	

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N	Author(s)	Paper Goal	Main Conclusions	Main Contribution	Limitations
108	Levitas and McFadyen (2009)	To assay the influence of R&D activities on the holding and management of corporate liquid assets	of capital expenditures thereby decreasing the available amount for overinvestment, or as a flexible mechanism for distributing cash via dividends Higher R&D intensity firms are likely to hold higher levels of liquid assets	To report the reciprocal influence between research-intensive firms and the holding of internal liquid assets by firms	To disentangle the signaling effects of patenting from the real cash flows derived from exploiting those patents
109	Lins et al. (2010)	To investigate what drives corporate liquidity around the world, particularly regarding the use of credit lines and nonoperating-cash holding purposes	Both credit lines and cash holdings are employed for precautionary motives. Credit lines that are used to hedge against future financial frictions may restrain what a firm spends on investment opportunities in potential future good times, while cash holdings are employed as insurance against future cash flow shortfalls in potential bad times	To provide evidence that both credit lines and cash holdings are used as buffers for future liquidity needs; however, the way each liquidity instrument is employed might vary according to the potential state of the world	
110	Liu and Mauer (2011)	To examine the effect of CEO compensation on corporate cash holdings	Greater incentives for CEO risk-taking positively influence higher liquidity levels	To find that CEO compensation has a negative effect on the value of cash whereas compensation incentives positively influence cash holdings by firms facing financial constraints	
111	Liu et al. (2014)	To study whether compensation incentives, such as pensions and deferred compensation, influence corporate cash holdings	CEO debt compensation incentives have a negative effect on cash holdings for firms with higher leverage while these debt incentives may induce higher cash reserves in poorly governed firms	To shed light on the way that compensation incentives should be designed to minimize agency conflicts proceeding from corporate cash policy decisions	

(Continues)

N	Author(s)	Paper Goal	Main Conclusions	Main Contribution	Limitations
112	Liu et al. (2015)	To explore the effect of family control on the cash holding policy in Chinese firms	The excessive control rights of shareholders is positively related to corporate cash holdings in Chinese family firms. This result suggests that controlling shareholders are likely to expropriate resources from firms at the expense of minority shareholders	To complement the empirical literature by showing the particular features of Chinese firms related to cash holding behavior, family control, potential family succession problems, and agency conflicts	The authors suggest future research on the use of internal capital markets by membership groups as a buffer mechanism to protect them against predatory behavior by competitors
113	Locorotondo et al. (2014)	To grasp the role of group membership on corporate cash policy inside Belgian firms	Business groups hold less cash than nonaffiliated firms, signaling evidence these membership groups have access to and availability from internal capital markets when they face financial constraints in Belgium	To show that intragroup guarantees have an essential influence on affiliated firms to reserve less cash. In this setting, financially constrained affiliated groups might rely on internal capital markets when they deal with financial frictions, maintaining equivalent amounts of cash holdings compared to other non-constrained business groups	
114	Louis et al. (2012)	To assess the impact of accounting conservatism on the marginal market value of cash holdings	Accounting conservatism might recognize previously inefficient investment decisions from financial reporting, signaling investors, and shareholders on new projects undertaken by managers, mitigating destruction of the firm's value related to cash reserves and minimizing agency conflicts	The first study to test empirically the effect of accounting conservatism on corporate cash hoardings	The conservatism effect might be related to other governance aspects for which there are no reliable, readily available proxies

(Continues)

N	Author(s)	Paper Goal	Main Conclusions	Main Contribution	Limitations
115	May (2014)	To study the effects of the Lehman Brothers bank default on corporate liquidity in firms under their loan commitment	Firms with credit line commitments from Lehman Brothers lost on average 3% of their market value around the days of Lehman's default. Moreover, these losses are significantly higher for firms with lower levels of cash holdings and greater financial constraints	To provide new insight on the interaction of bank default risk and loan commitments to borrowers	
116	Megginson et al. (2014)	To explore the relationship between state ownership and corporate cash holdings in privatized firms in China from 2000 to 2012	State ownership is negatively related to corporate cash holdings over time in privatized Chinese firms. The higher soft budget constraint effect that arises when financially constrained firms are supported by the government promotes lower cash holdings and a lower marginal value of cash by these firms	To emphasize the negative impact of soft budget constraint on cash holding behavior inside Chinese firms	
117	Meltzer (1963)	To explain how cyclical economic changes affect the demand for money by industry firms	To show that sales, business cycles, interest rates, financial assets, and the yield on private capital are considered important determinants of cash holdings in business firms	To show firms have to maintain cash reserves to support their transactions needs. The size of the sample	
118	Mikkelsen and Partch (2003)	To examine the effect of persistent large cash holdings on operating performance, governance mechanisms, and firm features such as size, related industry, investment, and R&D expenditures	To report no difference between the ownership of cash-rich firms and their peers regarding operating performance and governance mechanisms. However, firms with higher cash reserves have higher R&D expenditure levels and lower debt financing	To show persistent large corporate cash holdings do not lead to poor operating performance and agency conflicts in cash-rich firms compared to the lower cash firms	

(Continues)

N	Author(s)	Paper Goal	Main Conclusions	Main Contribution	Limitations
119	Mun and Jang (2015)	To study the impact of working capital and cash holdings on performance of restaurant firms	There is a nonlinear relationship between a firm's working capital and profitability that is moderated by the level of cash holdings	To present the role of cash holdings in the relationship between corporate working capital and performance	
120	Nason and Patel (2016)	To analyze the relationship between cash holdings and firm performance during a recession	Cash holdings are neither dead money nor king during a recession. Although the stock market rewards low to medium levels of cash holdings during a recession, the stock market also punishes when firms maintain high levels of cash reserves	To reinforce that the stock market evaluates the benefits of holding cash accordingly during the recession period (pre, during and after)	How firms convert cash to a firm-specific resource
121	Neamtiu et al. (2014)	To investigate how macroeconomic ambiguity can affect firm investment behavior and corporate cash holdings	As macroeconomic ambiguity increases, firms tend to hold more cash and invest less in capital expenditures over time	By discerning the effect of ambiguity from risk on corporate cash holdings and investment, in the presence of ambiguity firms are likely to decrease their investment level and increase their cash reserves	
122	Nikolov and Whited (2014)	To explore theoretically and empirically the link between corporate cash policy and agency issues such as limited managerial ownership, managerial perquisite consumption, and compensation based on firm size	Firms with higher block holder and institutional ownership ratios are likely to have greater loss of shareholder value, higher cash holdings, and higher managerial perquisite consumption	To point out that the mechanisms of agency conflicts are associated with corporate cash holdings	
123	Opler et al. (1999)	To investigate the precedent and subsequent cash holding factors among publicly traded U.S. firms	Firms with less access to capital markets, strong growth opportunities, higher business risk, and smaller size hold more	The first paper to systematically study the determinants of cash holdings, providing support to the trade-off theory	Despite initially proposing to examine the implications on cash holdings, the authors do not offer the subsequent

(Continues)

N	Author(s)	Paper Goal	Main Conclusions	Main Contribution	Limitations
			<p>cash than their counterparts. Further, cash-richer firms spend their excess cash on payouts to shareholders, new projects, and acquisitions even when these companies have poor investment opportunities</p>		<p>cash holding factors in their study</p>
124	Orens and Reheul (2013)	<p>To explore the relationship between idiosyncratic manager-specific influence on corporate cash holdings in a sample of Belgian small and medium-sized manufacturing enterprises</p>	<p>Cash holdings are positively related to CEO age and negatively related to CEO other-industry experience</p>	<p>To show that older CEOs tend to maintain higher levels of cash and CEOs with experience in other industries tend to hold less excess levels of cash compared to those without other-industry experience</p>	
125	Ozkan and Ozkan (2004)	<p>To examine empirically the relationship between managerial ownership and corporate cash holdings</p>	<p>To suggest a nonmonotonic relationship between managerial ownership and cash holdings in British firms. Further, higher cash holdings are associated with higher growth opportunities and cash flows, and lower leverage and banking debt</p>	<p>To supply evidence of the existence of a nonmonotonic relationship between ownership and cash holdings</p>	
126	Palazzo (2012)	<p>To assess how the correlation between cash flows and a source of aggregate risk affects the optimal corporate cash holding policy</p>	<p>Riskier firms hold more cash as a buffer against expected cash flow shortfalls</p>	<p>To highlight that positive and strong correlation between cash flow and aggregate risk impacts positively on corporate cash hoarding behavior</p>	
127	Pinkowitz and Williamson (2001)	<p>To evaluate the influence of a bank-centered system on cash holdings in Japanese firms</p>	<p>Firms under bank-centered systems hold more reserves to provide rents for the main bank and reduce banking monitoring costs</p>	<p>To show that banking power and cash holdings are positively related in Japanese firms over time</p>	

(Continues)

N	Author(s)	Paper Goal	Main Conclusions	Main Contribution	Limitations
128	Pinkowitz et al. (2006)	To investigate how corporate governance influences the effect of cash holdings and dividends on firm value around the world	The value of cash holdings for minority shareholders in higher investor protection countries is greater than for their counterparts in countries with weaker governance Firms that hold more cash are 23% less likely to employ cash to finance acquisitions than similar noncash richer firms. Further, cash richer firms tend to acquire their targets with stocks, assuring more financial flexibility	To link the value of cash holdings with governance mechanisms around the world To shed light on the influence of cash stockpiles on acquisitions payment method, exposing that firms prefer using stocks rather than their cash holdings for acquisitions	The authors could not exclude alternative explanations for their findings, such as the effect of financial reporting in countries with poor investor protection This article does not expose a clear argument to explain why cash richer firms choose stocks over other payment methods to invest in acquisitions
129	Pinkowitz et al. (2013)	To explore the influence of corporate cash holdings on the payment method for acquisitions	Technology spillover and market competition are positively related to corporate cash holdings	Setting apart the effects of technology spillover and market competition on corporate cash holdings. Indeed, firms respond to technology spillover and market rivalry by holding more cash to ensure financial flexibility to fund profitable future investment opportunities	
130	Qiu and Wan (2015)	To analyze the role of technology spillover and market rivalry on corporate cash holdings	The higher a firm's multinationality level the higher its corporate cash holdings, being more preeminent in countries with a higher degree of uncertainty avoidance	To introduce an interdisciplinary perspective on corporate liquidity, especially cash holding behavior, under national culture, firm multinationality, and uncertainty avoidance effects	
131	Ramírez and Tadesse (2009)	To examine the impact of national culture and firm multinationality on corporate cash holdings			

(Continues)

N	Author(s)	Paper Goal	Main Conclusions	Main Contribution	Limitations
132	Rapp et al. (2014)	To investigate the relationship between financial flexibility and corporate cash policy	Firms with higher financial flexibility are likely to hold more cash, pay less dividends, maintain less leverage and prefer share repurchase over dividend distribution	To explain theoretically and empirically the relevant role of financial flexibility on corporate financial policy, particularly those decisions related to payout behavior, capital structure and cash management	
133	Riddick and Whited (2009)	To frame theoretically and test empirically the interaction among cash holding antecedents, income uncertainty, and external financing costs	Firms have a negative propensity to save cash as positive productivity shocks impact the increase of cash flow and marginal product of capital	To offer a new theoretical perspective that firms have different propensities to save cash according their future states of productivity	
134	Schroth and Szalay (2009)	To study the impact of financing constraints and internal funds on the probability that a firm wins patent races	Cash holdings are determinants in the probability of winning drug and medical patents (innovative success) in U.S. firms	To identify that innovative success depends on how much more cash a firm holds than its rivals	
135	Simutin (2013)	To assess how excess cash holdings impact mutual fund performance	Abnormal cash holdings and future fund performance are positively related. Stocks purchased by high abnormal cash funds generate 2% more returns per year than the low abnormal cash counterparts	To show that higher cash holdings might benefit managers with flexibility to meet fund outflows and generate better returns	
136	Smith (2016)	To examine the relationship between firm financial policies and local corruption in the United States	Firms tend to shield their resources and financial policies from rent-seeking by decreasing liquidity and increasing leverage to reduce their capacity to pay bribes to public officials	To study corruption's effects on financial firms' policies and examine the value of political connections in a country with well-defined property rights and low levels of corruption	

(Continues)

N	Author(s)	Paper Goal	Main Conclusions	Main Contribution	Limitations
137	Song and Lee (2012)	To evaluate whether and how financial crisis impacts corporate liquidity management in the long term in eight East Asian countries	To find a significant negative relation between corporate cash holdings and investment, implying firms reduce their investment spending vis-à-vis an increase in their cash reserves	To suggest firms that experience exogenous shocks tend to boost their cash stockpiles according to changes in their demand function for cash holdings, particularly for constrained firms more than the unconstrained ones	
138	Subramaniam et al. (2011)	To explore the link between firm organizational structure and corporate cash holdings	Diversified firms have significantly lower cash holding levels and higher agency costs than focused firms due to their internal market access, allowing funding of their financial needs from the availability of cash flow across segments	To identify that non-governance factors regarding firm organizational structure, agency conflicts, and investment opportunities may affect corporate cash management and investment decisions inside firms	
139	Tong (2010)	To investigate the relationship between CEO risk incentives and corporate cash holdings under agency theory	Firms with higher CEO risk incentives hold less cash; however, these firms have a higher value of cash holdings	To debate the impact of CEO risk incentives on cash management under the corporate cash holding investment and agency perspective	
140	Tong (2011)	To focus on the effect of firm diversification on corporate cash holdings in the contexts of financial constraint and agency problems	Firm diversification has a negative impact on the value of cash holdings and a positive relation with the cash reserve level	To study the value impact of diversification strategy through corporate cash holdings under financial constraint conditions	
141	Wu et al. (2012)	To analyze the influence of financial deepening on the sensitivity of cash reserves to trade credit among Chinese listed firms from 1999 to 2009	Chinese firms in regions with a more developed financial sector hold less cash to cover trade payables and have a higher substitute ratio of credit receivables for cash, especially after the new receivables policy introduced in 2007	To show a higher level of financial deepening is negatively related to cash holding behavior and positively associated with short-term credit such as payables and receivables, improving the short-term financing function of trade credit	

(Continues)

N	Author(s)	Paper Goal	Main Conclusions	Main Contribution	Limitations
142	Xu et al. (2016)	To study the relationship between cash holdings and political uncertainty in Chinese firms	The political uncertainty created by government official turnover negatively influences corporate cash holding behavior	To show the influence of political uncertainty on corporate cash holdings in Chinese firms	
143	Yun (2009)	To assess whether and how corporate governance influences corporate liquidity management through a firm's choice between cash and credit lines	State-level changes in takeover protection lead poorly governed firms to switch from credit lines to cash holdings. Further, antitakeover laws and managerial discretion inside poorly governed firms induce these firms to hold more cash relative to lines of credit	To identify a specific relationship on the link between corporate governance and cash holdings	
144	Yung and Nafar (2014)	To study the impact of creditor rights on the relationship between corporate liquidity policy and firm value	Stronger creditor rights are related to higher levels of corporate cash holdings and lower firm value. Moreover, strong investor protections are negatively associated with cash retention and positively related to firm value	Better investor protection mitigates the effect of creditor rights on the level of cash holdings and firm value	

(Dittmar & Mahrt-Smith, 2007; Faulkender & Wang, 2006). This marginal value of cash might be influenced by changes in the level of internal funds (especially cash), the proportion of debt in a firm's capital structure, and the availability and accessibility of external financing (Faulkender & Wang, 2006). Thus, firms facing financing constraints (e.g., higher costs of external finance) ascribe a higher marginal value of a dollar retained to undertake valuable growth opportunities than firms that are unconstrained (Chen, Dou, et al., 2015; Denis & Sibilkov, 2010; Faulkender & Wang, 2006; Gao & Jia, 2015; Pinkowitz, Stulz, & Williamson, 2006; Tong, 2011).

The Sensitivity of Cash

As a recent topic in the literature, the sensitivity of cash view suggests that firms might have a propensity to save cash out of current cash flows when external financing is costly (Almeida et al., 2004) or income uncertainty is high (Riddick & Whited, 2009). If a firm is financially constrained it may have to incorporate savings from incremental cash flows to protect its future solvency. As a result, this firm might hold a considerable portion of cash as a hedging tool during downturns (Almeida et al., 2004).

Differing from the evidence of Almeida et al. (2004), Riddick and Whited (2009) find that corporate cash holdings and cash flows are negatively correlated after controlling for Tobin's Q. In such firms, as positive productivity shocks arise, the negative sensitivity of cash holdings from both cash flows and marginal product of

capital increases in absolute value. These findings suggest the importance of income shocks and the cost of external finance in determining corporate cash behavior.

Anderson and Carverhill (2012) also theoretically show that firms have a negative marginal propensity to save cash at higher profitability levels, regardless of their investment projects. Conversely, at lower profitability levels the relationship between investment and cash holdings becomes highly path-dependent (Anderson & Carverhill, 2012).

LITERATURE ANALYSIS OVERVIEW

In this section, we first describe the general features of the literature review performed. Next, we present an analysis and a discussion from each dimension (1–10) classified in this review.

General Features

Reviewing the cash holding literature allowed us to identify general features found in this research field. The main characteristics of the analyzed papers were as follows:

- Studies were published 8.47 years ago, on average. Nonetheless, 48.61% of all papers were published between 2013 and June 2017;
- 45.00% were published in journals with an impact factor greater than 3.5;
- 53.47% were conducted at American universities, and 41.67% were developed at other universities;
- 64.58% present new findings to the field;
- 96.53% are quantitative.

We identify that the major knowledge centers on cash holdings were the University of Illinois (6.25%), the University of Arizona (4.86%), Ohio State University (3.47%), Georgetown University (2.80%), and the London Business School (2.80%).

Many scholars have contributed to the literature on cash holdings. We assess a total of 245 researchers as authors and coauthors. Acknowledging the influence and contribution of a researcher encourages the improvement of knowledge within the field. One way to recognize good work is to identify the core areas that authors choose to research. To this end, we select individuals who authored at least three papers on cash holdings. Exhibit 6, Authors and their core areas on cash holdings, presents these authors and their core research areas related to cash holdings. It is evident that these authors have researched more than four topics related to cash holdings, confirming their important role in the development and improvement of knowledge in this field.

Cross-referencing the authors and coauthors of the selected papers identifies the networks among them. Our analysis also reveals the strength and direction of these relationships, as shown in Exhibit 7, Author and coauthor networks in the cash holding literature. A researcher can be just an author (yellow triangle), just a coauthor (gray triangle), an author of one paper and coauthor of another paper (green triangle), and a single author (blue triangle).

We can distinguish 12 networks with more than four researchers (shaded area in

gray), 16 with three researchers, 22 with two researchers, and 23 with single scholars. The arrows indicate the direction of the authorship, and more than one arrow indicates the strength among researchers. The strongest relationships are among H. Almeida, V. Acharya, M. Campello, and M.S. Weisbach, and between L. Pinkowitz and R. Williamson, meaning that these authors published at least three papers together.

An analysis of keywords reveals the evolution of literature in a specific field, especially by showing increases in the use of certain keywords over time (Furrer, Thomas, & Goussevskaia, 2008). Nearly 79% of 176 individual keywords retrieved from the articles were used only once, 12% were used twice, and 11% were used more than three times among the papers. Cash holdings is the most frequent keyword (47.6% of papers), followed by corporate governance (10.4%), cash (6.7%), capital structure (4.7%), and financial constraints (3.8%). The use of the keywords cash holdings, investment, liquidity, governance, financial constraints, acquisitions, firm value, and credit lines is also consistent and stable over time.

Other keywords such as determinants of cash, agency, trade-off, compensation, cash flow, repurchase, payout, and ownership have been used less frequently, whereas keywords such as risk, product market competition, trade credit, banking, and financial flexibility have been increasingly used in recent years. It is important to highlight that the relationships of these terms with cash

holdings add specific characteristics to the broad literature on the theme. For instance, state ownership and impact on cash holdings is studied by Megginson, Ullah, and Wei (2014), Kusnadi, Yang, and Zhou (2015), and Chen, Ghoul, Guedhami, and Nash (2018). In the context of market competition among innovative firms, Lyandres and Palazzo (2016) theoretically and empirically discusses how strategy could shape cash policies.

The thirty most frequently cited papers were written by 2.4 authors on average and cited at least 53 times. The literature review also indicates that 70% were published 13 years ago in journals with an impact factor greater than 4.0. Moreover, 83% were conducted in U.S. universities, 63% used a U.S. context, and 73% employed a temporal window of more than 10 years. Finally, 60% of the papers produced new findings, and 90% applied a quantitative analysis method using mathematical and/or empirical models.

Exhibit 8, Paper statistics: year, journal, knowledge center, and absolute citation account, presents data for the most frequently cited papers, including the year of publication, journal name, impact factor, absolute citation value, and the author affiliation(s) (university, college, or research center). We set 10 citations in all databases over time as the cutoff.

Exhibit 9, Citation path on cash holdings over time, summarizes the citation path among the most frequently cited studies. The figure shows the research pathway in chronological order and the most significant knowledge route

among cash holding studies. We can observe the strong influence of papers such as those by Kim et al. (1998), Opler et al. (1999), Harford (1999), Dittmar et al. (2003), Mikkelsen and Partch (2003), and Almeida et al. (2004) on the other articles. For example, the article by Opler et al. (1999) is cited by 71.4% of these papers.

Main Approaches

The first dimension of our categorization is related to the main approaches of cash holdings that were explored in the analyzed studies. Exhibit 10, Main approaches, papers, and citation numbers over time, shows the authors and citation for each approach. Each category represents a set of topics according to the paper's objective. Each article is assigned to a core category, represented by different letters. Certain papers (shown in different colors) are classified in more than one category because of interchangeable connections among themes. Among the articles, 33.1% of papers are in Category A, 8.9% in Category B, 14.5% in Category C, 18.6% in Category D, 15.8% in Category E, and 4.8% in Category F.

Method

The second category is associated with the methodology adopted for each study. The method was classified as A if the paper developed a conceptual or theoretical approach regarding cash holdings; B if the paper was quantitative, involving an empirical or/and mathematical model; C if it was qualitative; D if it was quantitative and qualitative

(and vice-versa); E if the paper was a study case; and F if the study used survey instruments to gather primary data. Approximately 91% of the articles were classified as quantitative (Category B), 3% were survey and quantitative (Categories B and F), and 3% were conceptual or theoretical (Category A). The majority of the quantitative studies (Category B) developed a mathematical model and then tested the predictions empirically. There was no analyzed paper that employed qualitative or case study methodology.

Statistical Tool and Data Analysis

Our third classification is related to the statistical tool and data analysis employed in each paper. The study was codified as A if the research used mathematical modeling, as B if the statistical analysis employed econometric models, as C if the study used computational methods, and as D if the paper applied a multivariate analysis. Approximately 53.47% of all articles used standard econometrics methods, 14.58% employed multivariate analysis, 6.9% applied mathematical modeling, and 24.31% used mixed data analysis methodology.

The empirical papers worked with the following data analysis tools: three-equation SURE; 2SLS regression; 3SLS regression; differences-in-differences methodology; Fama-McBeth regression; instrumental variables estimation; generalized method of moments (GMM) and advances such as GMM 4 and GMM 5; maximum likelihood

(ML); full-information maximum likelihood (FIML); simultaneous equations model; event study with CAR; logit, tobit, and probit regressions; multinomial logistic regression; ordinary least squares (OLS); Poisson regression; propensity score-matching methods; system of seemingly unrelated regression (SUR); weighted least squares (WLS); time-series and cross-sectional analysis; the Abadie-Imbens matching estimator; and regression discontinuity analysis.

In general, the reviewed studies presented a main empirical analysis with one specification model. However, the majority of these papers also used other statistical tools and data analysis methodology to robustness checks. OLS regressions were the most frequent traditional econometric instrument, used by 30.5% of the papers, followed by differences-in-differences (7.6%) and GMM models (6.7%). Certain econometric tools, including differences-in-differences methodology, regression discontinuity, Poisson regression, and the Abadie-Imbens matching estimator, have only been used since 2012.

Position in Analytical Model

The fourth category is related to the position (dependent or exploratory variable) in which the cash holding proxy has been used in the empirical and theoretical models. Because cash holdings are not readily available in financial statements, the literature has built different proxies for measuring this variable. Bates et al. (2009) suggest that the ratio of cash and cash equivalents to total assets is the most

traditional measure among papers. As reported by the authors, although the cash-to-net assets ratio and its logarithm can also represent cash holdings, they might produce outliers for firms with a high asset concentration in cash or with assets of less than US\$ 100 million. Although the authors choose one of these measures, they also use an alternative measure of cash holdings as a basic check for robustness.

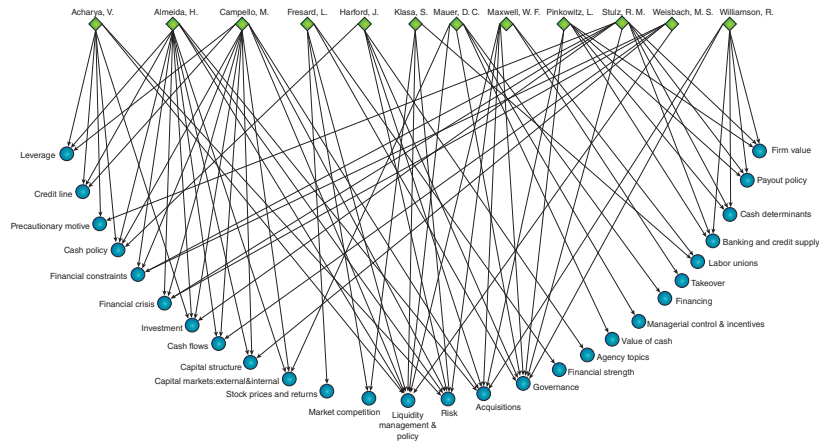
If cash holdings were influenced by other variables, the study was classified in Category A. We find 31 different variables revealed as determining factors when cash holdings are a dependent variable.

When the cash holdings proxy affects other variables, it was considered as an independent variable and the research was codified as B. There are two explanations for using cash holdings as an independent variable: (a) when investigating the effect of cash holdings on other financial factors, such as investments, acquisitions, stock returns, firm value, financing, and governance; and (b) when analyzing the relationship between two parameters influenced by cash holdings. In the latter case, cash holdings are used as a control variable.

Cash holdings are also used to build other variables related to studies on the sensitivity of cash to cash flow (Acharya et al., 2007; Almeida et al., 2004; Bao et al., 2012; Brisker, Çolak, & Peterson, 2013), excess and change of cash (Kahle & Stulz, 2013; Kusnadi & Wei, 2011; Opler et al., 1999; Riddick & Whited, 2009; Xu et al., 2016), and the value of cash holdings for investors (Faulkender & Wang, 2006).

Exhibit 6

Authors and Their Core Areas on Cash Holdings.



When an article contained one of these approaches it was classified as Category C.

Cash holdings are used as a dependent variable in 41.67% of all papers (Category A), as an independent variable in 22.92% of them (Category B) and to construct other variables in 24.31% (Category C). In Xu et al. (2016), two different hypotheses are tested and cash holdings are used as both a dependent variable and to build other variables. Cash holdings are the dependent variable in the model that assesses whether a firm maintains more cash during political uncertainty and to construct other control variables to evaluate whether the political uncertainty affects the market value of cash for shareholders (Xu et al., 2016).

Variable Source

The fifth category refers to the variable source of data used into the model. The research was classified as A if the source

originated from the balance sheet, as B if was from the market, as C if the paper used macroeconomic data, as D if the study employed exogenous variables, as E if it was used as primary data, and F if the study relied on other sources. Firm-specific factors such as size, age, net working capital, growth opportunities, profitability, cash flow, leverage, investment opportunities, capital expenditure, asset liquidity, risk, and research and development have been extensively explored as control variables. Exogenous factors such as investor protection systems, government quality, external capital markets, financial shocks, financial constraints, credit ratings, inflation, and corruption have also been identified as influential factors with regard to corporate cash retention behavior.

The analysis showed that 22 studies exclusively used data from balance sheets, 57 employed balance sheet and market data, and 17 used mixed sources from balance

sheets, market, and macroeconomic data. We also noted that 28 papers using quasi-experiments applied exogenous variables besides balance sheet and market data. Only three articles that were conceptual/theoretical did not use any source of empirical data.

Level of Analysis

The level of analysis indicated the population type used in each article and was regarded as the sixth dimension in this literature review. The study was classified as A if the empirical analysis examined firms across countries, as B if it was applied in a business group or conglomerate, as C if it was related to firms within sectors, segments, or industries, as D if it was considered firm level elements, and as E if the study dealt with other level analysis such as individuals, families, or households.

We identify that the analysis levels differed among the papers: 58.33% exclusively used

a firm-level approach (A), 14.58% examined firms within segments, 9.03% used firms across countries, and 3.47% used business groups in their study. Another interesting finding is that 94.3% of the papers used publicly listed firms, 1.9% used cross-listed companies (those listed on a different exchange than their original stock exchange), 1.9% used private firms (nonlisted), 0.9% explored small and medium-sized firms, and 0.9% studied family controlled firms.

Study Context

The seventh classification was associated with the study context. The article was categorized as A if the research analyzed several regions around the world, as B if the study context was in the United States and/or Canada, as C if it was in Europe, as D if it was in Asia/Oceania, as E if it was in Latin America, and F if it was in Africa.

The survey indicated that 83 papers studied an American or Canadian context, 24 analyzed distinct countries around the world, 13 used an Asia scope, 9 focused on Europe, and 13 articles did not employ any study context as they were theoretical or literature reviews.

Analysis Period

The period of analysis was the eighth dimension considered in this review. The majority of the papers (58.33%) studied periods longer than 10 years (Category A), while 20.83% used a temporal window between 5 and 10 years (Category B), 3.47% chose a range between 3 and 5 years

(Category C), and 8.33% were less than 3 years (Category D).

Theoretical Perspective

We classified all papers according to the most frequently theoretical perspective used by the authors in the cash holding literature: A—trade-off theory, B—pecking order theory, C—agency-based theories, D—other perspectives/contemporary trends, and E—if the paper did not match any previous criterion, being classified as not applicable.

The trade-off perspective supported 10.42% of the papers selected. Moreover, 93.33% of these papers were quantitative, 73.33% explored a period of more than 10 years, 73.33% analyzed firms, 60% focused on an American context, and 20% were published after 2013.

The pecking order theory was used in 3.47% of the analyzed studies. Although pecking order theory has played an important role in the finance field, few papers have used this theory to build arguments on cash holdings. Dittmar et al. (2003) suggest that pecking order arguments might confound the effect produced by other views such as trade-off and agency theories, particularly regarding the relationship among cash holdings, leverage, and investment opportunities.

Agency theory was employed as a theoretical basis for 34.72% of selected studies. Furthermore, 96% of these articles were quantitative, 57% explored a period of more than 10 years, 64% analyzed firms, 18% explored firms within countries, 64% were conducted in an American/Canadian context, 36% used non-American

settings, and 50% were published after 2013.

Contemporary trends, classified as category D, have received special attention among corporate finance scholars over the last 5 years (Almeida et al., 2014; Foley & Manova, 2014). These contemporary approaches are composed of topics related to financial constraints, market imperfections, internal capital markets, credit lines, trade, market competition, banking, risk, and credit supply. The studies also explored issues associated with cash holdings in fields such as marketing, culture, public administration, innovation, and accounting. Although Category D is less represented between 1997 and 2012 (16 articles), academic contributions to these themes significantly increased from 2013 to 2017 (43 studies).

Findings

Finally, the last classification of this review of literature was the paper's findings. Approximately 7.63% of the papers presented new findings (Category A), 26.39% displayed results consistent with previously published literature (Category B), 4.16% showed outcomes using previous models with different datasets or/and different time periods, and 1.38% were comparative studies (Category D). Notably, an impressive number of studies (82) are concentrated in Categories A and B, providing both new theoretical and empirical perspectives and obtaining analyses consistent with the results revealed by previous literature.

Exhibit 8

Paper Statistics: Year, Journal, Knowledge Center, and Absolute Citation Account (30 Most Cited Papers)

No	Paper	Year	Journal	IF (SCR)	Knowledge Center	Citations		
						Scopus [#]	ISI [#]	Google [#]
1	Opler et al. (1999)	1999	Journal of Financial Economics	4.505	The Ohio State University and Georgetown University	644	523	2,875
2	Almeida et al. (2004)	2004	The Journal of Finance	6.043	New York University, University of Illinois	515	430	2,370
3	Harford (1999)	1999	The Journal of Finance	6.043	University of Oregon	412	314	1,714
4	Lamont (1997)	1997	The Journal of Finance	6.043	University of Chicago	376	304	1,421
5	Dittmar and Mahrt-Smith (2007)	2007	Journal of Financial Economics	4.505	University of Michigan and University of Toronto	368	310	1,454
6	Bates et al. (2009)	2009	The Journal of Finance	6.043	Arizona State University, University of Georgia and The Ohio State University	341	299	1,661
7	Holmström and Tirole (1998)	1998	Journal of Political Economy	3.75	Massachusetts Institute of Technology	337	309	1,529
8	Campello et al. (2010)	2010	Journal of Financial Economics	4.505	University of Illinois and Duke University	285	235	1,167
9	Harford et al. (2008)	2008	Journal of Financial Economics	4.505	University of Washington, Virginia Tech, and University of Arizona	284	230	1,226
10	Dittmar et al. (2003)	2003	The Journal of Financial and Quantitative Analysis	1.673	Indiana University, University of Toronto, and London Business School	267	199	1,219
11	Kim et al. (1998)	1998	The Journal of Financial and Quantitative Analysis	1.673	Yonsei University, Southern Methodist University, and Hong Kong University of Science and Technology	266	196	1,145

(Continues)

No	Paper	Year	Journal	IF (SCR)	Knowledge Center	Citations		
						Scopus [#]	ISI [#]	Google [#]
12	Faulkender and Wang (2006)	2006	The Journal of Finance	6.043	Washington University	253	216	1,141
13	Pinkowitz et al. (2006)	2006	The Journal of Finance	6.043	Georgetown University and Ohio University	231	196	808
14	Acharya et al. (2007)	2007	Journal Financial Intermediation	1.627	London Business School, New York University, and University of Illinois	158	132	833
15	Ozkan and Ozkan (2004)	2004	Journal of Banking & Finance	1.776	University of York and University of Bristol	157	123	771
16	Kalcheva and Lins (2007)	2007	Review of Financial Studies	3.689	University of Utah and University of Arizona	151	124	594
17	Denis and Sibilkov (2010)	2010	Review of Financial Studies	3.689	Purdue University and University of Wisconsin	138	107	631
18	Fritz Foley et al. (2007)	2007	Journal of Financial Economics	4.505	Harvard Business School, University of Texas at Austin, and Australian National University	129	82	602
19	Mikkelsen and Partch (2003)	2003	The Journal of Financial and Quantitative Analysis	1.673	Oregon University	111	79	548
20	Lins et al. (2010)	2010	Journal of Financial Economics	4.505	University of Utah, London Business School, and Harvard University	95	81	417
21	Riddick and Whited (2009)	2009	The Journal of Finance	6.043	American University and University of Rochester	93	76	431
22	Gamba and Triantis (2008)	2008	The Journal of Finance	6.043	University of Verona and University of Maryland	91	79	461
23	Han and Qiu (2007)	2007	Journal of Corporate Finance	1.579	McMaster University	86	76	456
24	Campello et al. (2011)	2011	Review of Financial Studies	3.689	Cornell University, University of Amsterdam, and Duke University	83	68	416

(Continues)

No	Paper	Year	Journal	IF (SCR)	Knowledge Center	Citations		
						Scopus [#]	ISI [#]	Google [#]
25	Pinkowitz and Williamson (2001)	2001	Review of Financial Studies	3.689	Georgetown University	78	62	334
26	Fresard (2010)	2010	The Journal of Finance	6.043	HEC School of Management	77	69	393
27	Duchin (2010)	2010	The Journal of Finance	6.043	University of Michigan	70	60	326
28	Haushalter et al. (2007)	2007	Journal of Financial Economics	4.505	Pennsylvania State University and University of Arizona	61	48	324
29	Brown and Petersen (2011)	2011	Journal of Corporate Finance	1.579	Iowa State University and Washington University	61	52	310
30	Faleye (2004)	2004	The Journal of Finance	6.043	Northeastern University	53	42	195

Note: [#]Citation count taken on 26/06/2017.

GAPS AND FUTURE RESEARCH ON CASH HOLDINGS

Compiling the available knowledge on cash holdings allowed us to highlight the direction and potential avenues that may be explored for future research in the field. Although a considerable body of work on cash holdings has been produced to date, there remain several issues that new research could address.

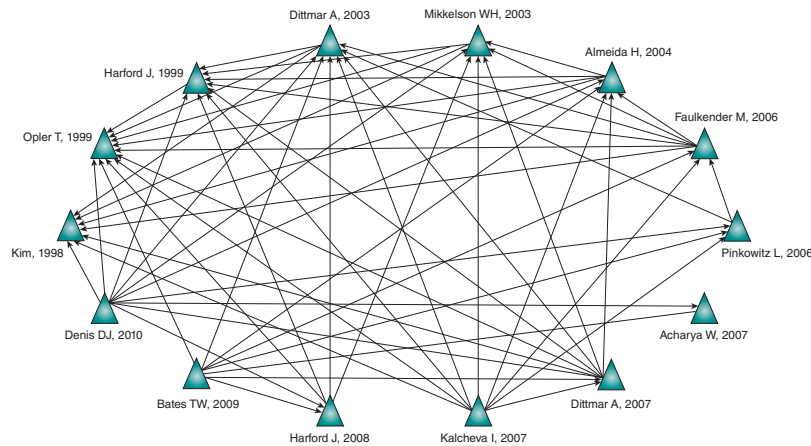
The questions regarding why and how firms hold cash remain to be answered (Almeida et al., 2014). In addition, the determinants and consequences of holding cash remain ambiguous, particularly across countries (Dittmar et al., 2003; Drobetz, Grüninger, & Hirschvogel, 2010; Huang, Elkinawy, & Jain, 2013; Pinkowitz, Stulz, & Williamson, 2015; Pinkowitz et al., 2006). Similarly, there is no consensus on the optimal level of corporate cash holdings (Almeida et al., 2004; Riddick & Whited, 2009).

In a recent study, Graham and Leary (2016) indicate the way in which cash holdings in American firms have evolved since 1920. Several interesting points are addressed to understand modern cash holding behavior, particularly those related to corporate cash targets, the rationale of holding cash and its determinants. As opposed to the more usual approach on cash holdings, Graham and Leary (2016) suggest that cash target models based on firm features have reduced the ability to explain the times series variation in average and aggregate cash holdings over the past century.

Basically, the study ascribes the increase in average cash to

Exhibit 9

Citation Path on Cash Holdings Over Time.



the large ratio of cash to assets maintained by Nasdaq and IPO firms in the post-1980 period. Moreover, Graham and Leary (2016) also affirm that several recent empirical relations interpreted as evidence of precautionary and transactions motives for holding cash in fact might be better supported by the financial frictions explanation. Graham and Leary (2016) findings indicate that optimal levels of corporate cash deviated from the target as a result of variation in current earnings and investment needs and the influence of macroeconomic variables such as interest rates, inflation, market volatility, economic growth, and tax rates. These factors also influenced the average aggregate cash holdings that previously were determined by firm characteristics (Bates et al., 2009; Kim et al., 1998).

These findings may reveal an opportunity for further studies in two important (and missing) topics on the

determinants and antecedents of cash holdings: the real consequences of corporate cash choices associated with the macroeconomic environment and the role of tax policies in corporate cash decisions around the world. The challenge of employing macroeconomic factors is to exploit natural heterogeneity across macroeconomic dimensions, particularly across countries and to find suitable instruments for representation (Almeida et al., 2014).

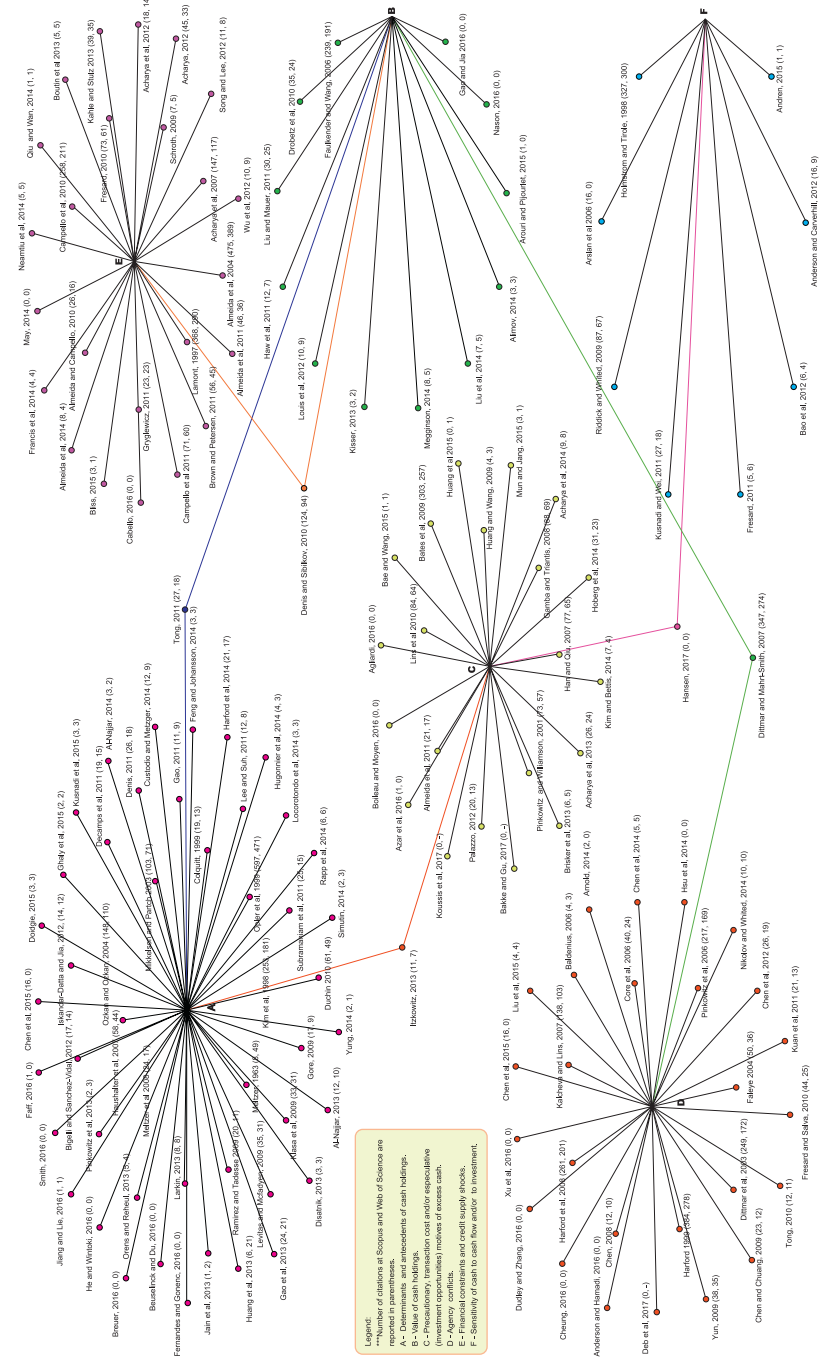
From a tax perspective, one should focus on identifying the repatriation tax incentives for firms to maintain their cash holdings in their boundaries. In a study by Fritz Foley et al. (2007), financially constrained firms with higher domestic leverage and lower investment grades indicate less propensity to defer taxes related to repatriation by hoarding cash overseas. However, the tests used by Fritz Foley et al. (2007) do not provide enough evidence

that these tax burdens reduce domestic cash balances, offering a worthwhile avenue to explore in future research. Such future research could improve understanding regarding the amount of cash held overseas and regarding the other reasons of holding cash, including precautionary, transactions, agency, diversification, and financial constraint motives (Almeida et al., 2014).

Another relevant debate is related to the variables used as proxies for different factors in the cash holding literature, including the cash holding variable. Many selected papers employed cash holdings as the ratio of cash over assets, without substantially explaining why this is more appropriate than cash-to-sales (Chen, Dou, et al., 2015; Huang et al., 2013), cash-to-noncash assets (Chen, Chen, Schipper, Xu, & Xue, 2012; Yun, 2009), pure cash to total assets (Bigelli & Sánchez-Vidal, 2012; Feng & Johansson, 2014), cash and

Exhibit 10

Main Approaches, Papers, and Citation Numbers Over Time.



cash equivalents to the market value of equity (Haw et al., 2011). Moreover, as noted by Almeida et al. (2014), there is a divergent view between what econometricians and economic agents consider corporate cash. All these issues must be considered because they might affect the outcomes found in the cash holding literature thus far. Furthermore, factors such as investment opportunities, diversification costs, the diversity of conglomerates, and the efficiency of internal capital markets continue to be a challenge for researchers because these variables are difficult to quantify empirically in a way that avoids measurement errors and reflects real variables (Bakke & Gu, 2016).

Many important relationships in the corporate cash holding literature were built on factors that are inherently endogenous and forward-looking (Bakke & Gu, 2016). Numerous recent studies have designed quasi-experiments and have used modern econometric techniques such as regression discontinuity, differences-in-differences estimators, matching methods, panel data methods, measurement error methods, and instrumental variables to handle endogeneity and identification concerns (Roberts & Whited, 2013). Notably, the challenge for the majority of the papers is to build an effective identification strategy. Bearing this in mind, future works should make clear and compelling arguments that support a better identification strategy focused on identifying the causal interpretations of correlations with cash holdings whose understanding is not yet clear (Roberts & Whited, 2013).

Publicly listed firms must disclose financial reports periodically, which provides a large, rich data set, especially in developed countries, and allows wide research into such firms. Conversely, the lack of data availability for private, small, and medium-sized firms is a natural barrier to their investigation. As long as data from these firms are released, future research should determine how patterns observed in publicly listed firms are distinguished (or not) from small, medium-sized, and private firms (Al-Najjar, 2015).

For instance, Al-Najjar (2015) suggests that the investigation of corporate governance and cash holdings in small and medium-sized firms around the world is a way to compare the development of governance mechanisms and their effects on corporate cash holdings by such firms. Kim and Bettis (2014) also recommend research into the dynamics of cash holdings and their strategic deployment among firms of different relative size across industries.

Dividing the papers by their organizational structure also reveals a potential research avenue. Among the selected papers, 2.85% studied diversified firms, 1.9% stated-owned companies, 0.9% IPO firms, 0.9% vertically integrated firms, 0.9% venture capital firms, 1.3% property-liability insurers, and 0.9% spin-offs. None of the papers explored cash holding issues related to private equity buy-outs or hedge fund activism, which have been considered relevant topics for future research in corporate finance (Brav, Jiang, & Kim, 2011; Davis et al., 2014).

In addition, the majority of research on cash holdings has been based in American, European, and Asian contexts. The greater availability and reliability of data, research financing, and concentration of knowledge centers in these regions might naturally promote the development and improvement of publications in the field. Nevertheless, as new data become available from different economic contexts such as emerging markets and Latin America, future works should investigate how these unexplored contexts present similar or different patterns from previously studied countries such as the United States, Germany, and China. For example, Al-Najjar (2013) notes that important internal corporate governance factors such as board characteristics, audit features, and CEO characteristics have been explored in developed countries, but require further analysis in emerging countries. Because countries differ in their financial and governance structures, firm cash holdings also might differ in behavior by country. We also highlight that the use of cash should be a topic for further investigation. Although the literature provides explanations on determinants and motives for cash holdings, it would be relevant to analyze how cash was further used by companies (Duchin et al., 2017) or even if it was eventually used.

Last but not least, we observe new opportunities for future studies from papers that develop theoretical insights and propositions to test empirically. In Koussis et al. (2017), testable

implications and predictions from a real option framework that integrates cash holdings, dividends, investment, and financing policies are available for empirical work. In Cabello (2017), a new methodology named Markov chains by blocks is presented to indicate the conditions and knowledge that ensure optimal cash in bank branching cash holdings. The author offers several theoretical propositions and a numerical example to be used in empirical research.

CONCLUDING REMARKS

Offering a broad literature review allows scholars and practitioners to better understand the corporate motivations for holding cash and the core ideas that have built the research pathway for the corporate cash holdings strand.

The literature on cash holdings has significantly increased since the 2008 financial crisis, indicating the considerable concern regarding cash holdings behavior of academic financial researchers around the world.

Our paper provides a summary of 144 articles from 1997 to June 2017 within 10 dimensions: main approach, method, statistical tool/data analysis, position of cash holdings variable in empirical models, data source, level of analysis, study context, analysis period, theoretical perspective, and findings.

The cash holding literature has focused on the following main approaches, namely, the determinants and antecedents of maintaining cash (48 papers); the value of cash holdings (13 articles); precautionary, transaction costs and speculative motives of excess cash

(20 papers); agency conflicts and incentives (27 papers); financial constraints and credit supply shocks (23 articles); and the sensitivity of cash (7 papers).

Reviewing the literature also revealed fruitful issues for future research. Themes related to the determinants of cash holdings, the motives for maintaining cash and the consequences of cash holdings on other corporate financial policies remain highly explored by researchers but also present interesting avenues to follow in future studies.

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