Cash holdings around the world: Financial crisis, culture and shareholder rights.

Alves, Paulo

CMVM, Lusofona University and ISCAL

2018

Cash holdings around the world: Financial crisis, culture and shareholder rights.

Paulo Alves

pauloalves@cmvm.pt

Portuguese Securities Market Commission (CMVM), Lusófona University and Lisbon Accounting and Management Institute (ISCAL)

Rua Laura Alves, nº 4 Apartado 14258 1064-003 Lisboa Portugal

Portugal

ABSTRACT

The goal of this paper is to study how cash holdings were affected by the financial crisis of 2008. Our results suggest that 2008 financial crisis had a negative impact on cash holdings and in the period from 2008 to 2014, contrarily to the 2009 and 2010. We hypothesize that firms in face of the present levels cash holdings do not need to accumulate more cash to eventual shortfalls. Our results show a negative impact of the shareholder rights on cash holdings during the financial crisis of 2008 and from 2008 to 2014. Possibly precautionary motive is losing power as explanatory theory, contrarily to agency hypothesis. We also have showed that cash holdings from collectivistic countries expresses a higher decrease in 2008 and from 2008 to 2014, contrarily to 2009 and 2010. The results for 2008 and from 2008 to 2014 contradicted our expectations once we have expected a lower decrease for nations where uncertainty and ambiguity is less tolerated accepted. It seems that collectivistic countries are tolerating more the risk because cash holdings reached values never recorded.

Keywords: *Financial crisis; Culture; Shareholder rights.*

1. INTRODUCTION

Why are firms hoarding large amounts of cash when there is no profitability in doing so? According to a study by PWC on non-financial corporations, there has been an average increase in firms' cash holding from the period of 2000 to 2014. Even after the major financial crisis of 2008, firms still hoard more cash than before. Is this a trend we will keep seeing in the future? Another recent article by Forbes presents that Alphabet is worth $500 billion, despite holding $80 billion in bank, which means that if you buy a share of Alphabet, you are effectively buying more than $100 in cash. Are companies sitting on cash because they have no growth opportunities or is there another reason to do so?

In fact, cash holdings are an important topic of corporate finance once when practioneers are valuing firms they discount the cash effects. However, cash holdings are also a central subject on corporate finance because they are often used to hedge against future cash shortfalls. Particularly, when there are many credit constraints and capital markets devaluation as result of financial crisis (Graham and Harvey (2001)). In fact, after the dot.com bubble, the subprime mortgage crisis and the European sovereign debt crisis, firms experienced difficulties on fundraising their activities and cash holdings behaved as a buffer to credit and capital market limitations. Cash holdings seem to be used as a precaution to financial distress as Keynes (1936) defined. The results of Ferreira and Vilela (2004) and Almeida *et al*. (2004) defend precaution as the main motive of firms holding cash. Keynes also considered the transaction and speculative motives to hold cash. The transaction motive is related with non-synchronisation between firms´ receipts and expenditures. The speculative motive, by its turn, is a strategy used by firms to hold cash so as to make the best use of any investment opportunity that arises later on. Other plausible reason to hold cash is related with fiscal environment, namely the tax for repatriating foreign income. In this case, firms prefer to hold cash instead of paying dividends (Foley *et al.* (2007)). However, the agency motive is the challenger of precautionary motive as explanation of cash holdings. Agency theory suggests that managers have an incentive to build up cash to increase the amount of assets under their control and to gain discretionary power over the firm investment decision (Dittmar *et al.* (2003) and Dittmar and Mahrt-Smith (2007)).

The determinants of cash holdings have been widely studied recently. The firm determinants of cash holdings are consensual (Opler *et al*. (1999), Ferreira and Vilela

(2004) and Al-Najjar (2013)) and are related to leverage, dividend payments, profitability, growth opportunities, firm size, capital expenditures and cash flow volatility. These firm variables explain the most well know corporate financing theories: trade off theory, pecking order theory and agency theory. However, the debate about cash holdings has centered on which motive influence it the most, particularly the precaution and agency motive, and more recently the growth opportunities motive. Opler *et al.* (1999), for a sample of US firms from 1971-94, did not find a strong relationship between cash holdings and agency costs. Similar results have been found by Ozkan and Ozkan (2004) for a sample of UK firms, by Faulkender (2002) for a sample of small US firms, by Ferreira and Vilela (2004) for a sample of European firms, and by Kalcheva and Lins (2007) for a sample of firms from 31 countries. However, Ditmar *et al*. (2003) found on agency costs an important determinant of cash holdings. Ditmar *et al.* (2007) highlight the role of corporate governance on cash holdings. According to their results the value of a dollar cash is lower if a firm presents lower standards of corporate governance. Gao *et al*. (2013) compared cash policies in public and private U.S. firms and concluded that the former present higher levels of liquidity and such is explained by agency costs. Lins *et al*. (2010), by its turn, showed that cash holdings are related to non-operational activities. In fact, these savings are made to avoid future cash shortfalls (precaution) instead of has being used in future growth opportunities.

The cash holdings trends have also been studied. Bates el al. (2009), for example, showed that US firms since the 1980s have increased their average cash holdings, contrarily to net debt. Graham *et al* (2015) documented, for a sample of firms traded on NYSE, AMEX and NASDAQ, not only a recent increase on firm cash holdings, but also the same pattern from 1920 to 1945 and the opposite from 1945 to 1970. Alves (2018) also exhibited, for a sample of firms from 41 countries, a rise on cash holdings from 1995 to 2014.

We contribute to the literature by studying the evolution of cash holdings during the crisis and post-crisis of 2008. The role of shareholder rights and culture had also been studied, particularly with the interaction of financial crisis of 2008.

Our results have showed that 2008 financial crisis had a negative impact on cash holdings and in the period from 2008 to 2014, contrarily to the 2009 and 2010. In fact, firms´ cash holdings have increased in 2009 and 2010 as precaution face to the opposite impact observed in 2008 consequence of financial crisis. We highlight likewise the

negative impact of cash holdings from 2008 to 2014, questioning whether the trend of cash holdings' increasing will not have reached its maximum. Perhaps firms in face of the present levels cash holdings do not need to accumulate more cash to eventual shortfalls.

Our results show a negative impact of the shareholder rights on cash holdings during the financial crisis of 2008. This result seems to strength the role of agency theory on cash holdings once it seems that managers are worried to use indiscriminately cash in negative NPV projects devaluating shareholder wealth. On the contrary, in 2009 and 2010 we observe a positive impact of shareholder rights on cash holdings, contradicting agency theory. However, the opposite occurred in the period from 2008 to 2014, although the impact had not been conclusive for all countries. As we previous referred possibly precautionary motive is losing power as explanatory theory, contrarily to agency hypothesis.

On the other hand, we also have showed that cash holdings from collectivistic countries expresses a higher decrease in 2008 and from 2008 to 2014, contrarily to 2009 and 2010. The results for 2008 and from 2008 to 2014 contradicted our expectations once we expect a lower decrease for nations where uncertainty and ambiguity is less tolerated accepted. These results are extensively to countries with different levels of capital market development, but not to different countries with different kind of law.

The remainder of this paper is organized as follows. Section 2 provides the hypothesis formulation and section 3 describes data and methodology. Section 4 presents the empirical results. Section 5 concludes.

2. HYPOTHESIS FORMULATION

2.1. Financial Crisis

The impact of recent financial crises on cash holdings has also been studied (Khale and Stulz (2013), Song and Lee (2012), Pinkowitz *et al*. (2013) and Alves (2018)). Kahle and Stulz (2013) present a decrease on firms´ cash holdings during 2007-2008 followed by a

sharp increase in 2009. Song and Lee (2012) show that the increase in cash holdings is not explained by changes in firm characteristics but by changes in the firm's demand function for cash, particularly the precautionary motive. Pinkowitz *et al*. (2013) show that American firms hold cash after the crisis more than firms with similar characteristics in the late 1990s, and that occurs for more profitable firms. Cash holdings seem to be supported by growth opportunities, instead precaution motive. Bliss *et al*. (2015) findings are also more in line with the growth opportunities hypothesis. The results of Alves (2018), by its turn, do not support the growth opportunities hypothesis once the impact of 2008 financial crisis on cash holdings (non-operational activities) was positive, contrarily to retained earnings (growth opportunities) and concluded, not only, for the existence of an increase on such variable after that event, but a negative impact of GDP growth on cash holdings. Graham and Leary (2015) using this indicator showed that, using data from 1920 until 2012 of US Center for Research in Security Prices (CRSP), cash holdings have a positive relation with GDP Growth.

H1: Firms´ cash holdings have decreased on year 2008.

H2: Firms´ cash holdings have increased on years 2008-2014.

H3: Firms´ cash holdings have increased on years 2009-2010.

In this context, we also evaluate the impact of GDP growth and inflation on cash holdings.

2.2. Shareholder Rights

The impact of shareholder protection on agency costs of managerial entrenchment has been widely studied (LLSV (2002), Claessens *et al* (2002), Lins (2003), e.g.) and it is consensual that managers can benefit of overinvestment when country-level protection is weak. Cash holdings can be used for such purpose. On the other hand, lower shareholder protection standards are associated to less external finance opportunities (La Porta *et al.* (1997, 1998)) and holding cash can be an alternative to undeveloped capital markets and banking systems. However, in line with the relevance of agency costs, some authors (Dittmar *et al.* (2003), e.g.) show firms placed on developed financial markets holding larger cash balances. In fact, the evidence does not point out that firms hold more cash simply because it is more difficult to access capital markets in countries with poor shareholder protection. Abundant research supporting a positive relationship between

shareholder protection and external financial opportunities (La Porta *et al*. (1997, 1998)) has been published. Identical relation has found for the impact of private credit on cash holdings (Kalcheva and Lins (2007), Lins *et al*. (2010)) and Alves (2018)). This indicates that there is no evidence for managers holding more cash simply because it is more difficult to access capital in markets with poor shareholder protection. In fact, the explanation for holding cash can be motivated by another issue, the agency theory, e.g., in the possibility of managers extracting wealth from shareholders. The impact of legal system, shareholders' rights and agency costs on cash holdings has been studied by several authors (Ditmar *et al*. (2003), Harford *et al.* (2008), Kalcheva and Lins (2007) and Lins *et al.* (2010)). Kalcheva and Lins (2007) document a negative relationship between cash holdings and shareholder protection, although without statistical significance. On the contrary, there is a profuse investigation about the role of agency costs on cash holdings, that is, research that shows firms holding less cash in countries with a weaker corporate governance system (Harford *et al.* (2008) and Pinkowitz *et al.* (2006)).

H4: Firms´ cash holdings were negatively influenced by shareholders rights .

The "antidirector rights index" of La Porta *et al*. (1998), that varies from 0 to 5, is used as a measure of shareholder protection. RL is rule of law and is from Worldwide Governance Indicators (http://info.worldbank.org/governance/wgi/index.aspx#home)). Annual Estimates of governance range from approximately -2.5 (weak) to 2.5 (strong) governance performance. We measure domestic credit as the domestic credit provided by financial sector (%GDP) as an indicator for the banking sector development and financial sector depth in a given country and year (source: World Bank). Capital market development is measured by market capitalization and is defined as the total value of all listed shares in a stock market as a percentage of GDP (source: World Bank).

2.3. Culture

Recent research has focused on the impact of cultural differences on different topics of corporate finance, namely on capital structure (Chui *et al.* (2002), Hackbarth (2008) and Fauver and MacDonald (2015)) and on cash holdings decisions (Ramirez and Tadesse

(2009), Chang and Noorbakhsh (2009) and Chen *et al*. (2015)). In fact, the traditional paradigm that assumes agents are rational pursuing the maximum utility is contradicted in psychology documents which refer managers tend to be overconfident and optimistic. Overconfidence and optimism tend to be higher on individualistic societies. While individualistic cultures put the emphasis on autonomy and on the challenging of the self, on collectivist nations the role of the group and their happiness is the most important value and the participation of the group is more prevalent (Hofstede *et al*. (2001)). A nation where uncertainty and ambiguity is more tolerated accepts the change and takes more and greater risks. In this sense, in countries formed by collectivistic social organizations firms tend to have higher debt ratios, as well as higher cash holdings. Following this line of research Ramirez and Tadesse (2009) show that firms in countries with high uncertainty avoidance hold more cash as a way to hedge against undesired states of nature. Chen *et al*. (2015) demonstrate that corporate cash holdings are negatively affected by individualism and positively affected by uncertainty avoidance. Chang and Noorbakhsh (2009) find that corporations hold larger cash and liquid balances in countries where the people tend to avoid uncertainty more.

H5: Firms in individualistic counties hold less cash than forms in collectivist countries.

Collectivism index is from Globe (https://globeproject.com/study_2004_2007#data) and varies from 1 (low collectivism) to 7 (high collectivism).

2.4. Firms characteristics

The firm determinants of cash holdings used for our study are the following: Dividend payout, Cash-flow, Cash-flow uncertainty, Liquidity, Leverage, Research and development (here forward mentioned as R&D), Tangibility, Growth opportunity and Size. The goal is to summarize all previous empirical evidence on these determinants.

The firm determinants of cash holdings are explained by the well known corporate financing theories: trade off theory (Myers (1977)), pecking order theory (Myers and Majluf (1984) and agency theory (Jensen (1986)). Trade off theory means firms set their optimal level of cash holdings comparing the marginal costs and marginal benefits of holding cash. While the main cost of holding cash is the opportunity cost of the capital

invested in liquid assets, the benefits of holding cash are associated to the lower transaction costs (related with the use of cash for payments instead to liquidate assets), reduction in the probability of financial distress and the possibility of implementing investments that could not be possible without that funds. The pecking order theory (POT) postulates that external financing is costly because there is asymmetric information between managers and investors. Consequently, firms should finance investments first with retained earnings, then with safe debt and risky debt, and finally with equity to minimize asymmetric information costs and other financing costs. According to this theory, contrarily to trade off theory, firms do not have target cash levels and cash is used as a buffer between retained earnings and investment needs. The free cash flow theory, by its turn, hypothesizes that managers have an incentive to build up cash to increase the amount of assets under their control and to gain discretionary power over the firm investment decision. Cash reduces the pressure to perform well and allows managers to invest in projects that best suit their own interests, but may not be in the shareholders best interest.

Table 1 – Firm variables definitions and summary of model predictions

Variable	definition	Trade-off theory	Pecking order theory	Free cash-flow theory
Dividend payout	Dividend payment is a binary variable.	Negative		
Cash-flow	Cash-flow is the ratio of cash-flow to assets. Cash-flow is earnings less dividends plus amortizations.	Negative	Positive	
Liquidity	Liquidity is the ratio of working capital minus cash and short-term investments to total sales.	Negative		
Cash flow uncertainty	Cash-flow uncertainty is the volatility of a firm´ s cash-flow (to assets) from 1995 to 2014. Industry sigma represents the annual average volatility of the firm´s sector from 1995 to 2014.	Positive		
Leverage	Leverage is computed as the ratio of total debt divided by total assets.	Negative	Negative	Negative
R&D	R&D is R&D expenses to sales ratio. Firms that do not report R&D expenses are considered to have zero R&D expenses.	Positive	Positive	
Tangibility	Tangibility is measured by tangible assets to total assets.	Negative	Positive	
Growth opportunity	Growth opportunities is measured by market-to-book ratio (MtB). MtB is total liabilities plus market capitalization to total assets.	Positive	Positive	Negative
Size	Size is measured as the natural logarithm of the book value of assets deflated in 1995 dollars.	Negative	Positive	Positive

3. DATA SAMPLE AND DESCRIPTIVE STATISTICS

The data extracted from WorldScope include firms from 32 countries: Argentina, Australia, Austria, Belgium, Brazil, Canada, Denmark, Egypt, Finland, France, Germany, Greece, Hong Kong, Indonesia, Ireland, Israel, Italy, Japan, Malaysia, Mexico, the Netherlands, the Philippines, Portugal, Singapore, South Africa, South Korea, Spain, Sweden, Switzerland, Turkey, the UK, and the US. The sample is diversified and includes 28,132 firms and 202,871 observations, covering emerging capital markets, namely, the largest, such as Mexico and Brazil; several developed capital markets, such as the UK and the US; diverse banking-oriented countries, including France and Germany; countries

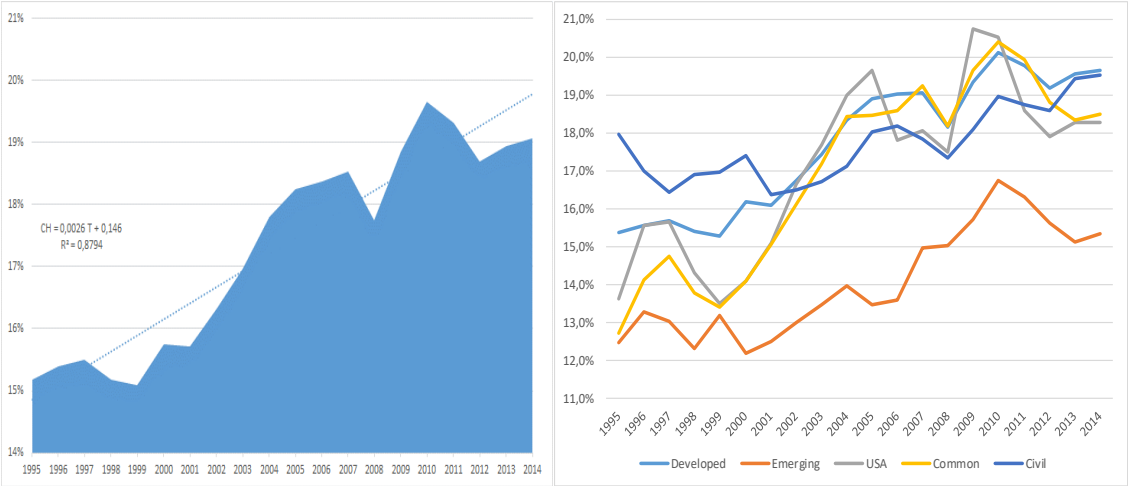
with different levels of investor protection, such as Italy and Hong Kong; nations with a collectivist environment like the Philippines, by opposition to individualistic countries as Switzerland; and countries whose economies show different levels of economic growth, such as Singapore and Greece (see Table 1). Data cover the period from 1995 to 2014. All firm-level variables are winsorized, excluding the bottom and the top 1% of the own variable distribution. In addition, financial institutions and utilities are excluded due the regulatory rules to which they are subject.

In previous literature two major ways of calculating cash holdings ratio have been developed. The first one divides cash and equivalents by total assets (Kim *et al.*, 1998; Ozkan and Ozkan, 2004) and the second one divides cash and cash equivalents by net assets (total assets minus cash and cash equivalents) (Opler *et al.*, 1999; Ferreira and Vilela, 2004). In this study, we have adopted the second definition of cash holdings.

Figure 1 presents firms´ annual average cash holdings from 1995 to 2014. It presents a positive trend from 1995 to 2014, beginning with 15,2% and ending on 19,1%, with a peak of 19,8% in 2010. These figures are in line with both Opler *et al.* (1999), which for a sample of US firms obtained a cash holding average of 17% and with Ferreira and Vilela (2004), which for a sample of EMU firms obtaining an average value of 15% for cash holdings.

Despite the development of financing markets, firms have increased their cash holding levels, revealing signs about the importance of maintaining liquid a high percentage of assets (Keynes (1936)). Such means that difficulties on external financing is not the only reason to hold cash. Actually, firms placed on developed capital markets have had, on annual average, from 1995 to 2014, 17,7% of their assets on cash. By its turn, firms located in emerging markets have presented 14,1% of their assets on cash. The mean differences present statistical significance. Comparing firms´ cash holdings located in common and civil law based countries we have not found a significantly statistical difference on means (17,0% against 17,7%). Consequently, it is not obvious that firms cash holdings are influenced by legal environment.

Fig. 1. Average cash holding ratio for the period of 1995-2014.



Average cash holding ratio for the period of 1995 to 2014 for our sample of firms year observations. Cash holding ratio is measured as cash and cash equivalents divided by net assets, where net assets is total assets minus cash and cash equivalents

Table 1 presents results for firm and country variables. Cash holdings are particularly higher in Hong Kong, Japan and Singapore, contrarily to Portugal, New Zealand, Argentina, Mexico and Greece. Such seems to confirm that firms located in countries with undeveloped financial markets present lower levels of cash holdings. Thus, it is not obvious that external finance difficulties is a reason to maintain cash. Firms placed on Japan and Finland, by its turn, are characterized by paying dividends, contrarily to Canadian, Israeli and Australian firms. Such explains the lower cash flow created by Australian and Canadian firms. In Philippines, Italy and Ireland firms present the highest values for liquidity. The opposite occurs in Finland, Denmark and Germany. Australia and Portugal present the largest and the lowest values for leverage. United States present the largest value for investment on R&D. This may explain why US firms have growth opportunities. The largest firms are located on Mexico and Netherlands.

Table 1 – Summary Statistics of Firm-Level and Country-Level Variables

All firm variables are from Worldscope. CH is cash and cash equivalents by net assets (total assets minus cash and cash equivalents). DividendD is a binary variable. CF is the ratio of cash-flow to assets. Cash-flow is the ratio of cash-flow to assets. Cash-flow is earnings less dividends plus amortizations. NWC is the ratio of working capital minus cash and short-term investments to total sales. Cash-flow uncertainty is the volatility of a firm´ s cash-flow (to assets) from 1995 to 2014. Industry sigma represents the annual average volatility of the firm´s sector from 1995 to 2014. D/A is computed as the ratio of total debt divided by total assets. R&D is R&D expenses to sales ratio. Firms that do not report R&D expenses are considered to have zero R&D expenses. Tang is measured by tangible assets to total assets. MtB is total liabilities plus market capitalization to total assets. Size is measured as the natural logarithm of the book value of assets deflated in 1995 dollars. DC is defined as domestic credit provided by banking sector as percentage of GDP (source: World Bank). MK is capital market development and is defined as the total value of all listed shares in a stock market as a percentage of GDP (source: World Bank). RL is rule of law and is from Worldwide Governance Indicators (http://info.worldbank.org/governance/wgi/index.aspx#home)). Estimate of governance (ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance) Inflation is from World Bank. GDP Growth source is also from World Bank. SR are shareholder rights and varies from 1 to 5 (La Porta *et al.* (1999)). Collectivism index is from Globe (https://globeproject.com/study_2004_2007#data) and varies from 1 (low collectivism) to 7 (high collectivism). Firms and N are the number of firms and observations, respectively. Sample period is from 1995 to 2014.

Country	Cash Holdings	Dividend D	CF	NWC	Industry Sigma	D/A	R&D	Tang	MtB	Size	DC	MK	RL	Inflation	GDP Growth	SR	Collectivism	Nº Firms	Nº OBS
ARGENTINA	0,10	0,42	0,06	0,04	0,13	0,21	0,00	0,40	1,18	11,67	0,32	0,15	-0,59	0,14	3,9%	4	6,15	78	781
AUSTRALIA	0,19	0,36	-0,03	0,00	0,16	0,16	0,01	0,40	1,66	9,39	1,31	1,08	1,76	0,03	3,1%	4	5,75	1 912	12 593
AUSTRIA	0,14	0,65	0,06	0,03	0,13	0,26	0,02	0,33	1,27	12,54	1,25	0,25	1,85	0,01	2,0%	2	5,27	125	1 083
BRAZIL	0,15	0,58	0,03	0,00	0,13	0,28	0,00	0,36	1,29	12,47	0,84	0,48	-0,27	0,10	3,1%	3	5,15	395	3 156
CANADA	0,14	0,28	0,02	0,01	0,16	0,22	0,02	0,46	1,63	10,93	1,84	1,09	1,74	0,02	2,4%	5	5,97	2 253	13 161
DENMARK	0,14	0,57	0,07	0,06	0,14	0,26	0,02	0,33	1,52	11,87	1,85	0,53	1,89	0,02	1,4%	2	5,5	215	2 007
EGYPT	0,20	0,72	0,06	0,04	0,13	0,17	0,00	0,38	1,48	10,95	0,84	0,51	-0,25	0,10	4,4%	2	5,56	138	905
FINLAND	0,15	0,75	0,07	0,06	0,14	0,25	0,02	0,28	1,56	12,53	0,99	1,10	1,95	0,02	2,4%	3	5,42	156	1 752
FRANCE	0,17	0,57	0,06	0,03	0,14	0,22	0,01	0,19	1,47	12,21	1,19	0,74	1,40	0,01	1,7%	3	5,42	1 112	9 703
GERMANY	0,16	0,46	0,05	0,09	0,14	0,21	0,02	0,26	1,52	12,22	1,37	0,45	1,64	0,01	1,4%	1	5,18	1 008	8 759
GREECE	0,10	0,53	0,03	0,05	0,13	0,30	0,00	0,36	1,40	11,16	1,09	0,46	0,71	0,03	0,7%	2	5,46	341	3 362
HONG KONG	0,24	0,50	0,02	0,02	0,15	0,20	0,01	0,27	1,31	11,49	1,64	7,59	1,43	0,00	3,8%	5	5,11	952	9 861
INDONESIA	0,14	0,45	0,06	-0,03	0,13	0,30	0,00	0,40	1,39	11,34	0,44	0,40	-0,68	0,12	4,9%	2	5,67	336	3 137
IRELAND	0,19	0,65	0,06	-0,05	0,15	0,24	0,01	0,33	1,62	12,53	1,37	0,59	1,60	0,03	6,1%	4	5,74	72	433
ISRAEL	0,20	0,36	0,04	0,00	0,16	0,32	0,03	0,24	1,29	11,48	0,86	0,81	0,90	0,02	4,1%	3	5,75	341	1 870
ITALY	0,15	0,57	0,04	-0,06	0,14	0,27	0,01	0,25	1,30	12,85	1,21	0,40	0,55	0,02	0,5%	1	5,72	276	1 968
JAPAN	0,21	0,75	0,04	-0,01	0,13	0,25	0,01	0,31	1,13	12,95	3,15	0,74	1,30	-0,01	0,8%	4	5,26	3 984	39 283
KOREA (SOUTH)	0,18	0,52	0,04	-0,01	0,15	0,27	0,01	0,34	1,10	11,95	1,45	0,75	0,93	0,02	4,2%	2	5,41	1 673	13 081
MALAYSIA	0,14	0,58	0,04	0,03	0,13	0,24	0,00	0,39	1,11	10,95	1,30	1,43	0,50	0,04	5,1%	4	5,85	952	8 410
MEXICO	0,10	0,44	0,06	0,03	0,13	0,25	0,00	0,42	1,26	13,21	0,36	0,28	-0,50	0,09	2,6%	1	5,95	123	1 097
NETHERLANDS	0,12	0,64	0,08	-0,01	0,14	0,25	0,01	0,27	1,70	13,28	1,56	1,03	1,74	0,02	2,6%	2	5,17	206	1 370
NEW ZEALAND	0,09	0,68	0,04	0,02	0,14	0,23	0,01	0,40	1,55	11,22	1,30	0,35	1,85	0,02	2,5%	4	6,21	113	668
PHILIPPINES	0,15	0,43	0,05	-0,06	0,14	0,21	0,00	0,35	1,37	10,56	0,52	0,55	-0,44	0,05	4,9%	3	6,18	155	1 313
PORTUGAL	0,08	0,54	0,05	-0,04	0,13	0,35	0,00	0,35	1,14	12,10	1,39	0,40	1,16	0,03	1,7%	3	5,94	81	519
SINGAPORE	0,21	0,60	0,05	0,00	0,14	0,22	0,00	0,32	1,20	11,45	0,80	2,06	1,61	0,01	5,8%	4	5,50	640	4 915
SOUTH AFRICA	0,15	0,63	0,08	-0,03	0,14	0,17	0,00	0,32	1,44	12,07	1,73	1,92	0,09	0,08	3,0%	5	4,99	446	2 432
SPAIN	0,12	0,64	0,06	-0,02	0,14	0,26	0,01	0,35	1,50	12,86	1,55	0,91	1,22	0,03	2,4%	4	5,79	160	1 189
SWEDEN	0,17	0,51	0,03	-0,01	0,15	0,19	0,02	0,21	1,80	11,61	1,28	0,90	1,88	0,02	2,3%	3	6,04	456	2 585
SWITZERLAND	0,18	0,70	0,07	-0,01	0,14	0,22	0,02	0,33	1,64	13,05	1,65	2,11	1,88	0,01	2,0%	2	4,94	213	1 899
TURKEY	0,13	0,39	0,06	0,01	0,13	0,22	0,00	0,34	1,43	11,94	0,59	0,30	0,05	0,18	4,3%	2	5,77	232	1 942
UNITED KINGDOM	0,15	0,61	0,04	-0,04	0,15	0,19	0,02	0,30	1,74	11,64	1,48	1,28	1,67	0,02	2,5%	5	5,55	2 235	10 919
UNITED STATES	0,17	0,31	0,04	-0,04	0,15	0,25	0,03	0,29	1,87	12,55	2,05	1,27	1,54	0,02	2,8%	5	5,77	6 753	36 718

Cash holdings are highly correlated with liquidity, industry sigma, leverage, research and development, tangibility, growth opportunities and size. The negative correlation with liquidity was expected once liquid assets other than cash can be liquidated in the event of a cash shortage,

they can be seen as substitutes for cash holdings. To reduce the probability of experiencing financial distress, firms with higher leverage are expected to hold more cash. That explains the negative correlation between leverage and cash holdings. Concerning to industry sigma a negative correlation with cash holdings was found. Firms present more volatile cash flows face a higher probability of experiencing cash shortages due to unexpected cash flow deterioration. Thus, cash flow uncertainty should be positively related with cash holdings. Research and development present a positive relation with cash holdings. In fact, once research and development produces valuable investment opportunities, the cost of being financially constrained is higher for firms that adopt such type of investment strategies. Tangibility, on the other hand, is negatively correlated with cash holdings. This result is consistent with the notion that tangible assets can be sold if a cash shortfall occurs and that firms with more collaterals encounter fewer problems issuing debt. Firms´ growth opportunities are negatively with cash holdings. That can have happened as result of the cost of incurring in a cash shortage is higher for firms with a larger investment opportunity set due to the expected losses that result from giving up valuable investment opportunities.

Regarding external finance it is not obvious that cash holdings are a substitute of them. In fact, a positive relationship between domestic credit (and market capitalization) and cash holdings is observed. On the other hand, there is a negative correlation between collectivism and cash holdings. It seems that firms placed in countries where citizens are more confident need to hold less cash.

Table 2 – Correlation Coefficients

All firm variables are from Worldscope. CH is cash and cash equivalents by net assets (total assets minus cash and cash equivalents). DividendD is a binary variable. Cash-flow is the ratio of cash-flow to assets. Cash-flow is earnings less dividends plus amortizations. NWC is the ratio of working capital minus cash and short-term investments to total sales. Cash-flow uncertainty is the volatility of a firm´ s cash-flow (to assets) from 1995 to 2014. Industry sigma represents the annual average volatility of the firm´s sector from 1995 to 2014. D/A is computed as the ratio of total debt divided by total assets. R&D is R&D expenses to sales ratio. Firms that do not report R&D expenses are considered to have zero R&D expenses. Tang is measured by tangible assets to total assets. MtB is total liabilities plus market capitalization to total assets. Size is measured as the natural logarithm of the book value of assets deflated in 1995 dollars. DC is defined as domestic credit provided by banking sector as percentage of GDP (source: World Bank). MK is capital market development and is defined as the total value of all listed shares in a stock market as a percentage of GDP (source: World Bank). RL is rule of law and (Worldwide Governance Indicators (http://info.worldbank.org/governance/wgi/index.aspx#home)). Estimate of governance (ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance). Inflation is from World Bank. GDP Growth source is also from World Bank. SR are shareholder rights and varies from 1 to 5 (La Porta *et al*. (1999)). Collectivism index is from Globe (https://globeproject.com/study_2004_2007#data) and varies from 1 (low collectivism) to 7 (high collectivism). Firms and N are the number of firms and observations, respectively. Sample period is from 1995 to 2014.

	Cash Holdings	DividendD	CF	NWC	Industry Sigma	D/A	R&D	Tang	MtB	Size	DC	MK	RL	Inflation	GDP Growth	SR	Collectivism
Cash Holdings	1,00																
DividendD	0,02	1,00															
CF	0,00	0,29	1,00														
NWC	-0,24	0,02	0,04	1,00													
Industry Sigma	0,16	-0,20	-0,08	-0,05	1,00												
D/A	-0,35	-0,13	-0,11	0,00	-0,15	1,00											
R&D	0,17	-0,11	-0,14	-0,02	0,19	-0,09	1,00										
Tang	-0,28	-0,01	0,03	-0,01	-0,09	0,19	-0,13	1,00									
MtB	0,20	-0,05	-0,02	-0,07	0,19	-0,12	0,16	-0,11	1,00								
Size	-0,12	0,39	0,31	-0,05	-0,23	0,16	-0,05	-0,07	-0,09	1,00							
DC	0,10	0,12	-0,01	-0,04	-0,03	0,02	0,05	-0,04	-0,06	0,23	1,00						
MK	0,08	-0,03	-0,02	0,01	0,03	-0,05	-0,02	-0,06	0,02	-0,05	-0,03	1,00					
RL	0,04	-0,05	-0,05	0,00	0,16	-0,08	0,10	-0,06	0,12	-0,01	0,30	0,16	1,00				
Inflation	-0,05	-0,06	0,01	0,00	-0,02	0,00	-0,03	0,05	0,03	-0,09	-0,40	-0,05	-0,41	1,00			
GDP Growth	-0,02	-0,02	0,04	0,03	0,00	-0,02	-0,03	0,04	0,07	-0,11	-0,39	0,18	-0,15	0,15	1,00		
SR	0,03	-0,08	-0,04	-0,07	0,11	-0,05	0,08	0,03	0,10	-0,02	0,36	0,32	0,35	-0,13	0,03	1,00	
Collectivism	-0,09	-0,22	-0,04	-0,04	0,13	-0,01	0,07	0,11	0,14	-0,18	-0,32	-0,23	0,03	0,22	0,19	0,30	1,00

4. EMPIRICAL RESULTS

The results presented in Table 3 show how cash holdings react to firm variables and to an institutional setting. The institutional setting is based on external sources of financing (domestic credit and capital market development), macroeconomic variables (inflation and GDP growth),

investors protection (shareholders rights and rule of law), and national culture (collectivism). We consider cross section regressions with year, country and industry dummies, a panel data of firms (on yearly basis) with random and fixed effects, and a dynamic panel data model based on generalized method of moments estimator of Arellano and Bond (1991), which includes one lag of the dependent variable used as an independent variable.

Concerning dynamic panel, the results obtained for Sargan test confirm their overidentification, that is, the hypothesis of instruments be valid was not accepted. The hypothesis for zero autocorrelation in first-differenced errors was also not accepted. In fact, Arellano and Bond approach is designed for situations with 'small T, large N' panels: few time periods and many individual units. We also evaluate if individual effects were correlated with the other regressors in the model and the results of Hausman test (1978) confirmed that the fixed effect model is consistent and random effects model is inconsistent.

The signals of firms´ variables are, in general, in line with the theory. Cash holdings respond positively to cash flows increases. This is in line with pecking order theory, that is, internal funds are less expensive than external funds. On the other hand, size and tangibility influence negatively cash holdings. In fact, larger firms with tangible assets need less levels of cash as a precaution to eventual cash shortfalls because they have an easily access to external funds. Liquidity, by its turn, influence negatively cash holdings. Liquidity is a substitute of cash holdings and consequently firms with more liquid assets substitutes are expected to hold less cash. Regarding the impact of growth opportunities on cash holdings we have found a positive value for the referred parameter. The larger losses of giving up valuable investment opportunities occur when we are in the presence of a firm with a larger investment opportunity set and such explains the positive impact of MtB on cash holdings. Finally, the results of table 3 also show a positive impact of R&D on cash holdings. Being R&D a proxy for financial distress it was expected a positive impact of such variable on cash holdings, and such was confirmed.

The results obtained for the impact of macroeconomic variables, as well as for institutional variables, investors protection variables and cultural variables are less consensual than firm variables. However, domestic credit has a positive impact on cash holdings and seems to strength the agency hypothesis, e. g., firms in a presence of an easier institutional setting to obtain external finance maintain highly levels of cash once it is more difficult to extract wealth from investors by management. Rule of law, by its turn, influence positively cash holdings. This result was not expected, as the more rule of law a country has, the lower the cash holdings a firm should have. In fact, we would expect that firms´ managers located on undeveloped capital markets and where investors are lower protected would prefer to hold cash to invest on projects that increase their non-pecuniary benefits, but with a negative impact on shareholder wealth. These results do not support the free cash flow theory of Jensen (1986), which assumes that if investors have less control over the firm, managers will have an incentive to accumulate cash to gain discretionary

power over the firm investment decisions. Thus, firms in countries with superior investor protection and better law enforcement are expected to hold less cash. Shareholder rights, contrarily to rule of law, seems to influence negatively cash holdings, in line with agency hypothesis and with the results in Dittmar *et al.* (2003). Collectivism, by its side, also influence negatively cash holdings. That means the more individualist a country is, the lower cash holdings a firm has, in line with Chen *et al.* (2015). Actually, an optimistic behavior by investors has as consequence a lower level of cash to face different alternative scenarios.

Table 3 – Regression of cash holding using firm and country level variables

Dependent variable is cash holdings. Cash holdings is cash and cash equivalents by net assets (total assets minus cash and cash equivalents). DividendD is a binary variable. Cash-flow is the ratio of cash-flow to assets. Cash-flow is earnings less dividends plus amortizations. NWC is the ratio of working capital minus cash and short-term investments to total sales. Cash-flow uncertainty is the volatility of a firm´ s cash-flow (to assets) from 1995 to 2014. Industry sigma represents the annual average volatility of the firm´s sector from 1995 to 2014. D/A is computed as the ratio of total debt divided by total assets. R&D is R&D expenses to sales ratio. Firms that do not report R&D expenses are considered to have zero R&D expenses. Tang is measured by tangible assets to total assets. MtB is total liabilities plus market capitalization to total assets. Size is measured as the natural logarithm of the book value of assets deflated in 1995 dollars. DC is defined as domestic credit provided by banking sector as percentage of GDP (source: World Bank). MK is capital market development and is defined as the total value of all listed shares in a stock market as a percentage of GDP (source: World Bank). RL is rule of law and (Worldwide Governance Indicators (http://info.worldbank.org/governance/wgi/index.aspx#home)). Estimate of governance (ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance). Inflation is from World Bank. GDP Growth source is also from World Bank. SR are shareholder rights and varies from 1 to 5 (La Porta *et al*. (1999)). Collectivism index is from Globe (https://globeproject.com/study_2004_2007#data) and varies from 1 (low collectivism) to 7 (high collectivism). N are the number of observations, respectively. Sample period is from 1995 to 2014.The GMM estimator developed by Arellano and Bond 1991) is used. AR (1) and AR (2) represent the tests Arellano-Bond absence of serial autocorrelation of 1st and 2nd order residuals, where the null hypothesis is the absence of autocorrelation tailings. The Sargan test is the test of over-identifying restrictions. The p-values are in parentheses below the corresponding robust parameter estimates.

	Year, Industry and Country dummies	Year and Country dummies	Year and Industry dummies	Country and Industry dummies	Industry dummies	Random Effects	Fixed Effects	GMM
$Cash\ Holdings_{t-1}$								-0,017
(p-value)								0,96
$DividendD_t$	0,005	0,003	0,011	0,005	0,011	0,007	0,005	-0,161
p-value	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,02
CF_t	0,065	0,066	0,058	0,065	0,057	0,054	0,054	0,170
p-value	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,50
NWC_t	-0,175	-0,178	-0,175	-0,175	-0,175	-0,207	-0,220	-0,439
p-value	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,02
$IndustrySigma_t$	(omitted)	0,290	(omitted)	(omitted)	(omitted)	0,460	(omitted)	(omitted)
p-value		0,00				0,00		
D/A_t	-0,253	-0,257	-0,250	-0,254	-0,252	-0,190	-0,163	-0,079
p-value	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
$R\&D_t$	0,357	0,367	0,343	0,357	0,342	0,157	0,062	-0,003
p-value	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,91
$Tang_t$	-0,178	-0,167	-0,172	-0,178	-0,173	-0,267	-0,326	-0,397
p-value	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
MtB_t	0,024	0,024	0,021	0,235	0,021	0,017	0,016	0,011
p-value	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
$Size_t$	-0,011	-0,010	-0,012	-0,011	-0,012	-0,012	-0,012	-0,005
p-value	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
DC_t	0,007	0,007	0,034	0,013	0,034	0,017	-0,001	0,019
p-value	0,00	0,00	0,00	0,00	0,00	0,00	0,71	0,00
MK_t	-0,001	-0,001	0,006	-0,001	0,006	0,000	-0,002	0,001
p-value	0,15	0,14	0,00	0,02	0,00	0,70	0,00	0,38
RL_t	0,030	0,030	-0,018	0,034	-0,019	-0,002	0,025	0,009
p-value	0,00	0,00	0,00	0,00	0,00	0,27	0,00	0,02
$Inflation_t$	0,014	0,014	-0,063	0,012	-0,064	-0,021	-0,010	-0,004
p-value	0,18	0,16	0,00	0,24	0,00	0,00	0,22	0,72
$GDPGrowth_t$	-0,055	-0,054	0,303	-0,072	0,145	0,039	0,007	-0,049
p-value	0,00	0,02	0,00	0,00	0,00	0,00	0,56	0,00
SR_t	(omitted)	(omitted)	-0,007	(omitted)	-0,008	-0,001	(omitted)	(omitted)
p-value			0,00		0,00	0,13		
$Collectivism_t$	(omitted)	(omitted)	-0,046	(omitted)	-0,042	-0,061	(omitted)	(omitted)
p-value			0,00		0,00	0,00		
R^2	0,30	0,30	0,29	0,30	0,29	0,18	0,18	
N	202 871	202 871	202 871	202 871	202 871	202 871	202 871	127 902
Sargan Test								550,787
p-value								0,00
AR (1)								-37,155
p-value								0,00
AR (2)								-1,915
p-value								0,06

The consolidation of the panel was an alternative found to the panel presented previously. In fact, we created a panel based on firms with 20 years of data. After that, we calculate the firms´ annual average by country, and consequently we have a panel with similar figures for T and N.

In general, the signs of parameters presented in table 3 are similar to those presented in table 4. However, we highlight the similitude of signs of the following parameters: net working capital, tangibility, market-to-book and domestic credit.

During the period from 2008 to 2014 cash holdings behaved differently. In fact, cash holdings have decreased in 2008. Probably, such was a result of negative unexpected cash flows. In 2009 and 2010 firms´ cash holdings have reacted positively as a precaution to recent financial crisis and to an eventual cash short fall. However, in the period from 2008 to 2014 we have assisted to a cash holdings decreases and such can have been a simultaneous result of domestic credit increases, substituting internal funds by financing banking, and cash flow decreases, and consequently internal funds.

Concerning to the interaction between the variables crisis with shareholder rights the results confirm the hypothesis that the higher shareholders rights a firm is located on, the lower cash holdings a firm has in 2008. It looks the hypothesis of unexpected lower cash flows is confirmed, as well as the free cash flow theory of Jensen. For the period from to 2009 to 2010 the impact of shareholder rights presents an opposite signal, supporting the precautionary hypothesis. For the whole period the negative impact of shareholder rights is confirmed. In fact, the impact of shareholders rights is negative in 2008 and in the whole period, contrarily to 2009 and 2010.

Finally, the results obtained for collectivism are similar to those found to shareholder rights. The negative impact of the composite variable, particularly of the optimistic variable, on cash holdings have confirmed the optimistic hypothesis. In fact, firms seem to tolerate uncertainty and ambiguity and consequently take more and greater risks, using more external funds. This is also valid for the period from 2008 to 2014. On the contrary, on the period from 2009 to 2010 the impact of the composite variable was positive. Such have signified that the impact of an increase on collectivist variable on 2009-2010 period have influenced positively cash holdings.

Table 4 – Regression of cash holding using firm and country level variables

Dependent variable is cash holdings. Cash holdings is cash and cash equivalents by net assets (total assets minus cash and cash equivalents). DividendD is a binary variable. Cash-flow is the ratio of cash-flow to assets. Cash-flow is earnings less dividends plus amortizations. NWC is the ratio of working capital minus cash and short-term investments to total sales. Cash-flow uncertainty is the volatility of a firm´s cash-flow (to assets) from 1995 to 2014. Industry sigma represents the annual average volatility of the firm´s sector from 1995 to 2014. D/A is computed as the ratio of total debt divided by total assets. R&D is R&D expenses to sales ratio. Firms that do not report R&D expenses are considered to have zero R&D expenses. Tang is measured by tangible assets to total assets. MtB is total liabilities plus market capitalization to total assets. Size is measured as the natural logarithm of the book value of assets deflated in 1995 dollars. DC is defined as domestic credit provided by banking sector as percentage of GDP (source: World Bank). MK is capital market development and is defined as the total value of all listed shares in a stock market as a percentage of GDP (source: World Bank). RL is rule of law and (Worldwide Governance Indicators (http://info.worldbank.org/governance/wgi/index.aspx#home)). Estimate of governance (ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance). Inflation is from World Bank. GDP Growth source is also from World Bank. SR are shareholder rights and varies from 1 to 5 (La Porta *et al.* (1999)). Collectivism index is from Globe (https://globeproject.com/study_2004_2007#data) and varies from 1 (low collectivism) to 7 (high collectivism). N are the number of observations, respectively. Sample period is from 1995 to 2014.The GMM estimator developed by Arellano and Bond 1991) is used. AR (1) and AR (2) represent the tests Arellano-Bond absence of serial autocorrelation of 1st and 2nd order residuals, where the null hypothesis is the absence of autocorrelation tailings. The Sargan test is the test of over-identifying restrictions. The p-values are in parentheses below the corresponding robust parameter estimates.

	Industry dummies	Random Effects	GMM System									
$Cash\ Holdings_{t-1}$			0,627	0,465	0,457	0,626	0,442	0,505	0,492	0,475	0,464	0,578
(p-value)			0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
$DividendD_t$	-0,013	0,004	-0,002	-0,004	0,000	-0,006	-0,007	0,001	-0,016	-0,005	0,000	-0,005
p-value	0,40	0,78	0,84	0,67	0,99	0,66	0,44	0,95	0,18	0,62	0,97	0,69
CF_t	-0,193	0,092	0,161	0,447	0,034	0,066	0,030	0,031	0,044	0,433	0,036	0,067
p-value	0,08	0,29	0,00	0,14	0,59	0,43	0,62	0,62	0,57	0,15	0,57	0,42
NWC_t	-0,289	-0,234	-0,194	-0,213	-0,202	-0,266	-0,277	-0,209	-0,240	-0,211	-0,201	-0,254
p-value	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
$IndustrySigma_t$	-0,203	-0,207	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)
p-value	0,20	0,71										
D/A_t	-0,095	-0,145	0,004	-0,020	-0,044	-0,064	-0,099	-0,055	-0,071	-0,020	-0,042	-0,064
p-value	0,01	0,00	0,94	0,74	0,43	0,36	0,03	0,34	0,24	0,74	0,45	0,36
$R\&D_t$	0,984	0,237	-1,663	0,064	-1,209	-0,936	-0,917	-2,357	0,752	0,144	-1,292	-0,960
p-value	0,03	0,59	0,23	0,96	0,44	0,69	0,44	0,23	0,63	0,91	0,41	0,68
$Tang_t$	-0,220	-0,183	-0,573	-0,308	-0,443	-0,499	-0,288	-0,368	-0,398	-0,312	-0,447	-0,490
p-value	0,00	0,00	0,00	0,00	0,00	0,00	0,01	0,00	0,01	0,00	0,00	0,00
MtB_t	0,002	0,008	0,030	0,009	0,025	0,026	0,009	0,023	0,015	0,009	0,026	0,023
p-value	0,80	0,27	0,00	0,28	0,01	0,00	0,27	0,03	0,06	0,24	0,01	0,01
$Size_t$	-0,009	-0,011	-0,009	-0,019	-0,006	0,007	0,000	-0,006	-0,004	-0,019	-0,006	0,003
p-value	0,03	0,00	0,46	0,03	0,69	0,63	0,98	0,69	0,78	0,03	0,70	0,24
DC_t	0,007	-0,009	0,042	0,035	0,031	0,050	0,025	0,032	0,036	0,035	0,032	0,047
p-value	0,34	0,40	0,00	0,03	0,03	0,00	0,08	0,04	0,00	0,03	0,03	0,00
MK_t	0,004	0,004	-0,006	-0,005	-0,003	-0,005	-0,005	-0,004	-0,005	-0,005	-0,003	-0,005
p-value	0,11	0,14	0,23	0,33	0,63	0,37	0,38	0,48	0,43	0,34	0,63	0,39
RL_t	-0,010	-0,009	-0,010	-0,027	-0,010	-0,016	-0,029	-0,016	-0,006	-0,027	-0,011	-0,015
p-value	0,08	0,47	0,39	0,06	0,36	0,13	0,06	0,25	0,57	0,06	0,35	0,15
$Inflation_t$	0,093	0,065	0,104	0,045	0,094	0,092	0,038	0,083	0,074	0,047	0,095	0,088
p-value	0,00	0,01	0,00	0,04	0,00	0,00	0,10	0,00	0,00	0,03	0,00	0,00
$GDPGrowth_t$	0,274	-0,129	-0,178	-0,093	-0,079	-0,186	-0,064	-0,058	-0,119	-0,093	-0,082	-0,183
p-value	0,03	0,12	0,00	0,09	0,15	0,00	0,21	0,27	0,06	0,09	0,14	0,00
SR	-0,004	-0,002	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)
p-value	0,25	0,85										
Collectivism	-0,037	-0,046	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)
p-value	0,00	0,23										
$Crisis_{2008}$				-0,015								
p-value				0,00								
$Crisis_{2009\text{-}2010}$					0,017							
p-value					0,00							
$Crisis_{2008\text{-}2014}$						-0,017						
p-value						0,02						
$Crisis_{2008}$ * SR							-0,005					
p-value							0,00					
$Crisis_{2009\text{-}2010}$ * SR								0,004				
p-value								0,00				
$Crisis_{2008\text{-}2014}$ * SR									-0,006			
p-value									0,00			
$Crisis_{2008}$ * Collectivism										-0,003		
p-value										0,01		
$Crisis_{2009\text{-}2010}$ * Collectivism											0,003	
p-value											0,00	
$Crisis_{2008\text{-}2014}$ * Collectivism												-0,003
p-value												0,01
R^2	0,44	0,30										
N	468	468	468	468	468	468	468	468	468	468	468	468
Sargan Test			14,76	11,69	12,46	13,42	13,06	13,72	16,44	11,81	12,39	13,93
p-value			1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
AR (1)			-1,78	-2,49	-2,13	-2,43	-2,43	-2,10	-2,23	-2,49	-2,13	-2,41
p-value			0,08	0,01	0,03	0,02	0,02	0,04	0,03	0,01	0,03	0,02
AR (2)			-1,28	-2,03	-1,38	-1,55	-1,64	-1,41	-1,67	-2,03	-1,38	-1,59
p-value			0,20	0,04	0,17	0,12	0,10	0,16	0,09	0,04	0,17	0,11

Finally, on table 5 we show the results of the previous composite variable by legal environment and capital market development. The results express a negative impact on cash holdings in 2008 of common law based systems where shareholders are highly protected. The opposite occurred in 2009 and 2010. On the other hand, cash holdings have reacted negatively in 2008 to developed capital markets with high shareholders rights. By its turn, in 2009 and 2010 the impact has been positive. From 2008 to 2014 we have observed a negative impact of the composite variable $Crisis_{2008\text{-}2014}$*SR either in common law based countries or in developed capital markets, although without statistical significance. The results obtained for the composite variable crisis * Collectivism on cash holdings in 2008 was negative either on common law based countries, or in developed capital market. The opposite occurred two years following. On the other hand, on the whole period we observed a negative impact of the composite variable on cash holdings, although without statistical significance when legal regime is taken into consideration.

Table 5 – Cash holdings and financial crisis

Dependent variable is cash holdings. Cash holdings is cash and cash equivalents by net assets (total assets minus cash and cash equivalents). DividendD is a binary variable. Cash-flow is the ratio of cash-flow to assets. Cash-flow is earnings less dividends plus amortizations. NWC is the ratio of working capital minus cash and short-term investments to total sales. Cash-flow uncertainty is the volatility of a firm´ s cash-flow (to assets) from 1995 to 2014. Industry sigma represents the annual average volatility of the firm´s sector from 1995 to 2014. D/A is computed as the ratio of total debt divided by total assets. R&D is R&D expenses to sales ratio. Firms that do not report R&D expenses are considered to have zero R&D expenses. Tang is measured by tangible assets to total assets. MtB is total liabilities plus market capitalization to total assets. Size is measured as the natural logarithm of the book value of assets deflated in 1995 dollars. DC is defined as domestic credit provided by banking sector as percentage of GDP (source: World Bank). MK is capital market development and is defined as the total value of all listed shares in a stock market as a percentage of GDP (source: World Bank). RL is rule of law and (Worldwide Governance Indicators (http://info.worldbank.org/governance/wgi/index.aspx#home)). Estimate of governance (ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance). Inflation is from World Bank. GDP Growth source is also from World Bank. SR are shareholder rights and varies from 1 to 5 (La Porta *et al*. (1999)). Collectivism index is from Globe (https://globeproject.com/study_2004_2007#data) and varies from 1 (low collectivism) to 7 (high collectivism). N are the number of observations, respectively. Sample period is from 1995 to 2014.The GMM estimator developed by Arellano and Bond 1991) is used. AR (1) and AR (2) represent the tests Arellano-Bond absence of serial autocorrelation of 1st and 2nd order residuals, where the null hypothesis is the absence of autocorrelation tailings. The Sargan test is the test of over-identifying restrictions. The p-values are in parentheses below the corresponding robust parameter estimates.

	Common *vs* Civil			Developed *vs* Emerging			Common *vs* Civil			Developed *vs* Emerging		
Cash Holdings$_{t-1}$	0,673	0,579	0,401	0,673	0,554	0,501	0,666	0,581	0,389	0,319	0,515	0,528
(p-value)	0,00	0,00	0,01	0,00	0,00	0,00	0,09	0,00	0,00	0,05	0,00	0,00
DividendD_t	0,004	-0,001	-0,014	0,012	-0,005	-0,017	0,006	-0,002	-0,012	0,003	-0,001	-0,008
p-value	0,74	0,93	0,28	0,50	0,63	0,16	0,63	0,89	0,34	0,84	0,95	0,53
CF_t	0,116	0,093	0,047	0,150	0,054	0,063	0,117	0,090	0,049	0,085	0,038	0,090
p-value	0,06	0,15	0,54	0,08	0,44	0,44	0,07	0,17	0,53	0,23	0,59	0,28
NWC_t	-0,263	-0,191	-0,234	-0,226	-0,215	-0,244	-0,257	-0,192	-0,274	-0,168	-0,213	-0,201
p-value	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
D/A_t	-0,086	-0,020	-0,066	-0,015	-0,046	-0,070	-0,094	0,019	-0,089	-0,042	-0,056	-0,024
p-value	0,05	0,73	0,33	0,81	0,43	0,29	0,07	0,75	0,17	0,49	0,33	0,73
$R\&D_t$	-1,943	-2,142	0,780	-4,105	-1,280	0,878	-1,951	-1,989	0,052	-2,679	-2,260	0,164
p-value	0,22	0,31	0,70	0,18	0,51	0,55	0,28	0,29	0,98	0,27	0,30	0,92
$Tang_t$	-0,438	-0,446	-0,343	-0,588	-0,406	-0,399	-0,407	-0,446	-0,315	-0,439	-0,377	-0,473
p-value	0,00	0,02	0,02	0,00	0,00	0,00	0,00	0,00	0,02	0,00	0,00	0,00
MtB_t	0,023	0,026	0,012	0,030	0,024	0,015	0,020	0,027	0,012	0,011	0,022	0,021
p-value	0,04	0,02	0,13	0,00	0,02	0,04	0,04	0,02	0,10	0,23	0,03	0,03
$Size_t$	0,007	-0,009	-0,015	0,008	-0,006	-0,010	0,007	-0,008	-0,009	-0,023	-0,005	-0,016
p-value	0,67	0,59	0,17	0,68	0,71	0,48	0,69	0,59	0,49	0,00	0,74	0,09
DC_t	0,037	0,032	0,027	0,039	0,033	0,038	0,034	0,033	0,027	0,021	0,033	0,041
p-value	0,01	0,04	0,00	0,01	0,03	0,00	0,01	0,04	0,00	0,14	0,04	0,00
MK_t	-0,005	-0,006	-0,003	-0,010	-0,004	-0,005	-0,005	-0,006	-0,003	-0,005	-0,003	-0,006
p-value	0,37	0,26	0,62	0,07	0,50	0,45	0,42	0,26	0,64	0,31	0,51	0,35
RL_t	-0,019	-0,015	0,005	-0,015	-0,016	-0,007	-0,020	-0,015	0,005	-0,023	-0,014	-0,007
p-value	0,14	0,28	0,60	0,24	0,26	0,55	0,13	0,29	0,65	0,15	0,31	0,50
$Inflation_t$	0,077	0,092	0,076	0,081	0,085	0,070	0,069	0,094	0,071	0,065	0,080	0,093
p-value	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,03	0,00	0,00
$GDPGrowth_t$	-0,226	-0,102	-0,085	-0,342	-0,065	-0,110	-0,263	-0,099	-0,078	-0,096	-0,055	-0,137
p-value	0,07	0,06	0,13	0,00	0,26	0,05	0,07	0,07	0,13	0,11	0,29	0,03
$Crisis_{2008}$ * SR * Law	-0,004											
p-value	0,04											
$Crisis_{2009\text{-}10}$ * SR * Law		0,004										
p-value		0,04										
$Crisis_{2008\text{-}14}$ * SR * Law			-0,004									
p-value			0,24									
$Crisis_{2008}$ * SR * Developed				-0,005								
p-value				0,00								
$Crisis_{2009\text{-}10}$ * SR * Developed					0,005							
p-value					0,00							
$Crisis_{2008\text{-}14}$ * SR * Developed						-0,004						
p-value						0,19						
$Crisis_{2008}$ * Collectivism * Law							-0,003					
p-value							0,01					
$Crisis_{2009\text{-}10}$ * Collectivism * Law								0,004				
p-value								0,03				
$Crisis_{2008\text{-}14}$ * Collectivism * Law									-0,003			
p-value									0,24			
$Crisis_{2008}$ * Collectivism * Developed										-0,003		
p-value										0,00		
$Crisis_{2009\text{-}10}$ * Collectivism * Developed											0,004	
p-value											0,00	
$Crisis_{2008\text{-}14}$ * Collectivism * Developed												-0,003
p-value												0,03
N	468	468	468	468	468	468	468	468	468	468	468	468
Sargan Test	12,27	13,94	17,72	13,44	13,81	16,92	12,53	13,79	17,17	13,48	13,92	16,09
p-value	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
AR (1)	-2,04	-1,88	-2,30	-2,15	-1,84	-2,34	-2,16	-1,88	-2,64	-1,74	-2,19	-2,12
p-value	0,04	0,06	0,02	0,00	0,07	0,02	0,14	0,06	0,01	0,08	0,03	0,03
AR (2)	-1,39	-1,36	-1,68	-1,45	-1,43	-1,57	-0,92	-1,37	-1,57	-1,63	-1,33	-1,47
p-value	0,17	0,17	0,09	0,15	0,15	0,12	0,36	0,17	0,12	0,10	0,18	0,14

5. CONCLUSION

We contribute to the literature by studying the evolution of cash holdings during the crisis and post-crisis of 2008. The role of shareholder rights and culture had also been studied, particularly with the interaction of financial crisis of 2008.

Our results have showed a negative impact of 2008 financial crisis and from 2008 to 2014 on firms´ cash holdings. The opposite has happened in 2009 and 2010. In fact, firms´ cash holdings have increased in 2009 and 2010 as precaution face to the opposite impact observed in 2008 consequence of financial crisis. We highlight likewise the negative impact of cash holdings from 2008 to 2014, questioning whether the trend of cash holdings' increasing will not have reached its maximum. Perhaps firms in face of the present levels cash holdings do not need to accumulate more cash to eventual shortfalls.

Our results show a negative impact of the shareholder rights on cash holdings during the financial crisis of 2008. This result seems to strength the role of agency theory on cash holdings once it seems that managers are worried to use indiscriminately cash in negative NPV projects devaluating shareholder wealth. On the contrary, in 2009 and 2010 we observe a positive impact of shareholder rights on cash holdings, contradicting agency theory. However, the opposite occurred in the period from 2008 to 2014, although the impact had not been conclusive for all countries. As we previous referred possibly precautionary motive is losing power as explanatory theory, contrarily to agency hypothesis.

On the other hand, we also have showed that cash holdings from collectivistic countries expresses a higher decrease in 2008 and from 2008 to 2014, contrarily to 2009 and 2010. The results for 2008 and from 2008 to 2014 contradicted our expectations once we would expect a lower decrease for nations where uncertainty and ambiguity is less tolerated. These results are extensively to countries with different levels of capital market development, but not to different countries with different kind of law.

BIBLIOGRAPHY

Almeida, H., Campello, M., and Weisbach, M. S. (2004). The cash flow sensitivity of cash. Journal of Finance, 59, 1777–1804.

Al-Najjar, Basil (2013). The financial determinants of corporate cash holdings: Evidence from some emerging markets, International business review, Vol. 22, Issue 1, pp. 77-88.

Alves, P. (2018). Abnormal retained earnings around the world, Journal of Multinational Financial Management, 46, 63-74.

Arellano, Manuel & Bond, Stephen (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations, The review of economic studies, Vol. 50, Issue 4, pp. 277-297.

Bates, T. W., Kahle, K. M., and Stulz, R. M. (2009). Why do US firms hold so much more cash than they used to?. *The Journal of Finance*, *64*(5), 1985-2021.

Bliss, B., Yingmei, A., and Deni, D., (2015). Corporate payout, cash retention, and the supply of credit: Evidence from the 2008–2009 credit crisis, Journal of Financial Economics 115, 521–40.

Chang, K., and Noorbakhsh, A., 2009. Does national culture affect international corporate cash Holdings?, Journal of Multinational Financial Management, 19, 323-342.

Chen, Y., Dou, P. Y., Rhee, S. G., Truong, C., and Veeraraghavan, M. (2015). National culture and corporate cash holdings around the world. Journal of Banking & Finance, 50, 1-18.

Chui, A.C.W., Alison, E.L., Kwok, C.C.Y., (2002). "The determination of capital structure: is national culture a missing piece to the puzzle?", Journal of International Business Studies 33, 99–127.

Claessens, S., S. Djankov, J. Fan, and L. Lang (2002). Disentangling the incentive and entrenchment effects of large shareholdings, Journal of Finance, 57, 2741–2771.

Dittmar, A., Mahrt-Smith, J., & Servaes, H. (2003). International corporate governance and corporate cash holdings. *Journal of Financial and Quantitative Analysis*, *38*(1), 111-133.

Dittmar, A., and Mahrt-Smith, J. (2007). Corporate Governance and the Value of Cash Holdings. Journal of Financial Economics, 83, 599-634.

Faulkender, M. W. (2002). Cash holdings among small businesses. University of Maryland.

Fauver, L., & McDonald, M. B. (2015). Culture, agency costs, and governance: International evidence on capital structure. Pacific-Basin Finance Journal, 34, 1-23.

Ferreira, M. A., and Vilela, A. S. (2004). Why do firms hold cash? Evidence from EMU countries. *European Financial Management*, *10*(2), 295-319.

Foley, C. F., Hartzell, J. C., Titman, S., & Twite, G. (2007). Why do firms hold so much cash? A tax-based explanation. *Journal of Financial Economics*, *86*(3), 579-607.

Gao, Huasheng; Harford, Jarrad and Li, Kai (2013). Determinants of corporate cash policy: Insights from private firms, Journal of Financial Economics, Vol. 109, Issue 3, pp. 623-639.

Graham, J.R. and Harvey, C.R. (2001), The theory and practice of corporate finance: evidence from the field, Journal of Financial Economics, Vol. 60, pp. 187-243.

Graham, J. R., Leary, M. T., and Roberts, M. R. (2015). A century of capital structure: The leveraging of corporate America. *Journal of Financial Economics*, *118*(3), 658-683.

Hackbarth, D. (2008), Managerial traits and capital structure decisions, Journal of Financial and Quantitative Analysis, 43, 843–882.

Harford, J., Mansi, S. A., & Maxwell, W. F. (2008). Corporate governance and firm cash holdings in the US. Journal of Financial Economics, 87(3), 535-555.

Hausman, J.A. (1978). Specification Tests in Econometrics, Econometrica, 46 (6), 1251–1271

Hofstede, G. (2001). Culture's consequences (2nd ed.). Thousand Oaks, CA: Sage.

Jensen, M. C. (1986). Agency costs of free cash flow, corporate finance, and takeovers. The American economic review, 76(2), 323-329.

Kahle, K., and Stulz, R. (2013). Access to capital, investment, and the financial crisis. Journal of Financial Economics, 110(2), 280-299.

Kalcheva, I., and Lins, K., 2007. International evidence on cash holdings and expected agency problems. Review of Financial Studies 20, 1087–1112.

Keynes, J. M. (1936). The general theory of employment, investment, and money. London and New York

Kim, C. S., Mauer, D. C., & Sherman, A. E. (1998). The determinants of corporate liquidity: Theory and evidence. *Journal of financial and quantitative analysis*, *33*(3), 335-359.

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer and Robert W. Vishny. (1997) Legal Determinants of External Finance. Journal of Finance 52, 1131-50.

La Porta, R., Lopez-De-Silanes, F., Shleifer, A., and Vishny, R.. (1998). Law and Finance. Journal of Political Economy 106 (6):1113–1155.

La Porta, R., F. Lopez-de-Silanes, A. Shleifer, and R. W. Vishny (2002). Investor protection and corporate valuation, Journal of Finance 57 (3), 1147–1170.

Lins, K., (2003), Equity ownership and firm value in emerging markets, Journal of Financial and Quantitative Analysis 38,159-184.

Lins, V. K., Servaes, H., and Tufano, P. (2010). What drives corporate liquidity? An international survey of cash holdings and lines of credit. Journal of Financial Economics, 98, 160-176.

Myers, S. C. (1977). Determinants of corporate borrowing. *Journal of financial economics*, *5*(2), 147-175.

Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. Journal of financial economics, 13(2), 187-221.

Opler, T., Pinkowitz, L., Stulz, R., & Williamson, R. (1999). The determinants and implications of corporate cash holdings. Journal of financial economics, 52(1), 3-46.

Ozkan, A., and Ozkan, N. (2004). Corporate cash holdings: An empirical investigation of UK companies. Journal of Banking & Finance, 28(9), 2103-2134.

Pinkowitz, L., Stulz, R., Williamson, R., 2006. Does the contribution of corporate cash holdings and dividends to firm value depend on governance? A cross-country analysis. Journal of Finance 61, 2725–2751.

Pinkowitz, L, Stulz, R., and Williamson, R., (2013), Is there a U.S. high cash holdings puzzle after the financial crisis?, Working paper series.

Ramirez, A., and Tadesse, S.. (2009), Corporate cash holdings, uncertainty avoidance and multinationlity of firms. International Business Review,18, 387-403.

Song, K., and Lee, Y.-J. (2012), Long-term effects of a financial crisis: Evidence from cash holdings of East Asian Firms, Journal of Financial and Quantitative Analysis, 47(3), 617-641.