WHY SO MUCH CASH IN EUROPEAN FIRMS? AN EMPIRICAL STUDY 1986-2015 [1]

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ABSTRACT

Based on this empirical research the average cash-to assets ratio for European industrial and commercial firms has increased from 10.2% in 1986 to 16.2% in 2015. Our panel is composed of 40140 observations for 2878 unique firms incorporated in twelve Eurozone core countries. The main objective of this paper is to study whether the change in cash holdings in the last 30 years is different in Europe (compared to the US) and whether the reasons for holding cash are similar or different.

It seems that cash ratios increase because firms' cash flows become riskier over the period. Among the different theories, it appears that the precautionary motive for cash holdings plays an important role in explaining the increase in cash ratios of European companies over the period 1986-2015. According to this precautionary motive we found that loss making firms tend to accumulate more cash. We find also that non dividend paying firms had higher cash ratios than dividend payers over the period 1997-2015. To our knowledge, this study is the most comprehensive empirical research on the cash holdings of European firms since Feirrera and Vilela (2004).

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INTRODUCTION

Most of the empirical literature on cash holdings concerns US firms and covers the pre-2008 crisis period. Empirical evidence shows that, in the US, the cash-to-assets ratio of public firms has more than doubled between 1980 and the mid-2000 (Bates et al., 2009). The main reasons for this change are the higher risk in firms' cash-flows and the increased proportion of smaller and R&D intensive firms in US listed firms (Bates et al., 2009; Begeneau & Palazzo, 2016), thus confirming the precautionary motive for holding cash.

The objective of this paper is twofold. First, we study whether the change in cash holdings in the last 30 years is different in Europe (compared to the US) and whether the reasons for holding cash are similar or different. We thereby aim at contributing to the corporate finance literature by showing whether the level of cash holdings, a key financial management decision, is impacted by regional or national factors. Although most European countries are part of a political and economic union, they are characterized by different business practices (e.g. intercompany payment delays, ownership concentration), laws (e.g. bankruptcy law, investor protection, taxation) and capital markets development, all linked to their respective economic and legal histories. Europe therefore offers a rich ground for such a study. Second, we study whether the major adverse shock of the 2008 financial crisis has affected the cash holdings policy of European firms.

We aim at answering to the following research questions:

1. Is there a secular increase in cash holdings in European public firms since the 1980's, as evidenced in the US? Is this increase (if any) due to the same reason than in the US (i.e. change in the characteristics of public firms, with an increased proportion of smaller and riskier firms)?
2. Has the major adverse shock of the 2008 financial crisis impacted the cash holdings in European firms?
3. Empirical evidence in the US provides a strong support for the precautionary motive to hold cash and no or weak support for the agency and tax motives. Are motives similar for European firms? Present evidence for European firms is scarce, rather old, and finds mixed support for both precautionary and agency motives (Feirrera & Vilela, 2004). We therefore test the impact of precautionary, agency and tax motives on cash holdings in European firms.
4. Do firms in different European countries behave similarly or differently as regards the changes in cash holdings and the motives for holding cash? How can country differences, if any, be explained?

1. WHAT ARE THE MOTIVES TO HOLD CASH?

According to the finance literature, there are four main motives for firms to hold cash. We briefly review them below.

Transaction motive

Transaction costs occur when a firm needs to raise new funds or to convert non cash financial assets into cash in order to pay for expenses or new investments, as described in classic models in finance (e.g. Miller & Orr, 1966). As there are economies of scale in transaction costs (Mulligan, 1997), large firms are expected to hold less cash. However, as firms and financial intermediaries have become more efficient in handling financial transactions and because in the progress in information technology, the transaction motive might have lost importance with time (Bates et al., 2009).

Precautionary motive

The rationale of the precautionary motive is that firms hold cash in order to be able to better cope with adverse shocks, particularly when their access to financial markets is difficult or costly. Consequently, three main factors are expected to explain higher cash holdings: (1) financial constraint due, for example, to difficult access to capital markets, negative or low profitability, small size; (2) idiosyncratic risk, because firms bearing a higher risk are expected to be more sensitive to adverse shocks and, therefore, more exposed to the risk of experiencing cash shortage or bankruptcy; and (3) investment opportunities, because adverse shocks and financial distress are expected to be more costly for firms with numerous profitable investment opportunities, as they might have to give up valuable projects when faced to cash shortage or bankruptcy. The precautionary motive has been evidenced as a major explanation for the secular increase in cash holdings in US public companies since 1980. It has been shown that this evolution is mostly due to the increase in cash-flow risk and to the growing proportion of smaller, riskier and R&D intensive firms in the newly listed firms (Bates et al., 2009; Begeneau & Palazzo, 2016).

Firms which pay no or low dividends, with low or negative net income, with difficult access to debt, as well as small firms are more likely to be financially constrained. Empirical evidence shows that these firms tend to accumulate more cash. Opler et al. (1999) find that large firms have lower cash ratios than small firms. According to Almeida et al. (2004), US firms with low payout ratios, small firms, and firms with no or low debt ratings have higher cash holdings than other firms. Bates et al. (2009) have showed that non dividend paying US firms, negative net income firms, as well as small firms have higher cash holdings and have increased their cash holdings in higher proportions than other firms during the 1980-2006 period. In Europe, Ferreira & Vilela (2004) find that small firms and firms with low assets' liquidity have higher cash ratios, but do not find evidence of a relation between dividend policy and cash holdings.

Previous research suggests that firms with high cash-flow risk tend to hold more cash (Opler et al. 1999; Bates et al., 2009). The latter show that US firms belonging to industries with a higher cash flow volatility hold more cash and have increased their cash holdings in higher proportions than other firms between 1980 and 2006. However, Feirrera & Vilela (2004) find a negative association between cash-flow risk and cash holdings in European firms. There is also empirical support for investment opportunities and cash holdings being positively related. R&D intensive firms (Begenau & Palazzo, 2016), high tech firms (Bates et al., 2009) and firms with high market-to-book ratios (Feirera & Vilela, 2004; Opler at al., 1999) have been found to hold more cash.

Tax motive

Tax motive stipulates that firms with foreign affiliates tend to hold more cash in their foreign affiliates as way to avoid tax that could incur with repatriating foreign earnings (Foley et al., 2007). As an illustration of this behavior, we can mention the financial policies of GAFA firms with their foreign subsidiaries. For example, as per Q3, 2016, Apple Corporation was holding a total of $ 232 billion of cash, of which $ 215 billion was located in international subsidiaries (Source: Apple financial report Q3, 2016).
On the other hand, Dittmar et al. (2003) consider that excess cash holding could be explained when controlling families force their firms to hold cash instead of distributing it, in countries where taxes are higher on earnings once distributed.

Agency motive

The free cash flow theory of Jensen (1986) is considered as a potential theoretical model that explains firms cash holdings. This model suggests that cash is held and sometimes built up by managers, who are less concerned in shareholder wealth, in order to gain discretionary power over the firm investment decisions. There are many ways of interpreting the excess cash holding from an agency problems perspective. Cash holding allows managers to invest in projects that more suit their own interest, and

not consequently the interest of the shareholders. It could also allow managers, who hold cash because they are risk adverse, to avoid market discipline (in case of takeover for instance). Therefore, cash could be used as a tool for antitakeover amendments when shareholders are highly dispersed (Opler et al., 1999). Cash holdings could also be explained by the ownership structure when controlling families force firms to hold more cash that could be considered as a sign of wealth (Dittmar et al. 2003).

Even though the importance of agency motive as a potential theoretical model for excess cash holding, little evidence of the managerial entrenchment hypothesis as an explanation of cash holdings has been found (Opler et al. 1999; Faulkender, 2002; Ozkhan and Ozkhan, 2002; Feirera & Vilela, 2004; among others).

However, cash holding could be explained by the level of legal protection for shareholders. La Porta *et al.* (2000) have found that firms pay more dividends to shareholders in countries where the latter benefit of high legal protection, while firms tend to hold more cash in countries where shareholders have weak legal protection. This result has been confirmed by Dittmar et al. (2003).

2. VARIABLES, SAMPLE AND DATA

In order to compare our results with US evidence, we use a methodology similar to Bates et al. (2009) who studied the cash holdings of US firms from 1980 to 2006.

2.1. Variables

The dependent variable used to measure cash holdings is the cash-to-assets ratio, which is equal to cash and cash equivalents divided by total assets. The independent variables used to test the precautionary motive for holding cash are derived from the empirical literature and are indicated below (details of variable definitions and calculation are given in Appendix 1):

- Leverage (total financial debt / total assets)
- Firm size (total assets)
- Recent IPO status: dummy variable indicating whether the company was IPOed in the last five years
- Dividend dummy: indicates whether the firm pays a dividend in a given fiscal year
- Loss dummy: indicates whether the firm had a negative net income in a given fiscal year
- Industry cash flow risk: this is a measure of industry idiosyncratic risk. It is obtained by first calculating firm cash flow risk, obtained by the standard deviation of firms' cash flow to assets ratios during the 10 years preceding each observation, and then calculating the average cash flow risk of all firms belonging to a given industry. Industries are defined by two digit SIC codes.
- Tobin's Q
- R&D expenses to sales
- Capex to assets
- Net working capital requirement to assets

2.2. Sample and data

Our sample includes all firms in Datastream which are incorporated in one of the twelve Eurozone core countries: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxemburg, Netherland, Portugal and Spain. These countries include the countries which initially joined the Eurozone in 1998

plus Greece, which was admitted in 2001. We exclude financial firms (two digits SIC codes from 60 to 69) as they may carry cash for meeting capital requirement provisions rather than for the economic motives we study. We cover the years 1986 to 2015, which yields a panel of 40140 observations for 2878 unique firms.

The data include surviving and non-surviving firms that appear on Datastream at any time in the sample period.

3. THE EVIDENCE OF THE INCREASE IN CASH HOLDINGS OF EUROPEAN COMPANIES

3.1. Cash holdings

The average cash ratio in our sample of European companies has increased from 10.2% in 1986 to 16.2% in 2015 (table 1, figure 1). The median cash ratio follows a similar evolution, increasing from 6.6% in 1986 to 10.6% in 2015. However, this increase in cash holdings does not follow a constant trend along time and mostly seems to be linked to a sharp change that occurred between 1996 and 2000. As can be seen in figure 1, the average cash ratio follows a first plateau during the 1986-1996 period, fluctuating between 10.2% and 11.5%, then increases from 1996 to 2000 to reach a second plateau, where it fluctuates between 13.1 and 16.2% during the 2000-2015 period. A possible explanation for the quick increase in cash holdings from 1996 to 2000 might be the financial euphoria prevailing at the time and linked to the emergence of new communication technologies (internet, mobile phones…) which led to numerous IPOs and SEOs by high tech companies. More investigation is indeed needed to validate this hypothesis. The moderate changes in the cash ratio occurring around 2008 (decline from 15.3% in 2007 to 13.9% in 2008, then increase to 14.4% in 2009) do not seem to indicate a major impact of the 2008 financial crisis on cash holdings. The median cash ratio follows similar trends.

Interestingly, we also observe over the total period an increase in the volatility of cash holdings. As a matter of fact, the standard deviation of the cash ratio increases from 10.1% in 1986 to 17.5% in 2015. This seems to indicate that the cash policies of European firms tend to be more diverse.

3.2. Leverage

We measure leverage as the ratio of total financial debt (long term and short term) divided by total assets. The average leverage for our sample shows two successive trends (Table 1, Figure 2). It first strongly increases from 1986 (5.4 %) to 2001 (17 %), then sharply decreases between 2001 and 2015. We may suspect that the decrease in leverage over the last 15 years may be explained by the use of cash by European firms to decrease debt. This may be one of the reasons why we observe a stabilization of the cash ratio in the last 15 years. As a consequence, we cannot find a significant trend in the leverage over the total period (see Table 2).

3.3. Europe vs. US

A strong increase in cash ratios is found both in our sample of European companies and in US companies, but our results put in evidence differences between the two regions. First, the average cash holdings are much higher in the US than in Europe. If we focus on the common observation period between our study and Bates et al., which is 1986 to 2006, the average cash ratios for our sample, compared to the US, are respectively 10.2% (US: 15.7%) in 1986 and 15.3% (US: 23.2%) in 2006. During this common observation period, the difference between average US and European cash ratios is positive and fluctuates between 3% and 8% (Figure 3). Second, the increase in cash holdings in the

US follows a steadier trend than in Europe. The sharp increase between 1996 and 2000, surrounded by two periods of relative stability, which is evidenced in our results, does not appear in the results of Bates et al..

This European evidence is also different from the American one as regards leverage. Bates et al. document a rather steady leverage in US firms, with average leverage varying inside a rather narrow range: 21.5% minimum (2005) and 28.9% maximum (1998). The average leverage of European companies is both less stable, as evidenced in section 3.2 above, and much lower. During our observation period, it fluctuates between a minimum of 3.3% (2013) and a maximum of 17% (2001). It thus seems that European firms both hold less cash and are less leveraged than US firms. So, even if European companies have increased their cash holdings, like American ones, during the recent decades, their behavior in terms of financing policy is different on average.

Table 1: Average and median cash and leverage ratios from 1986 to 2015.

The sample includes 40140 observations.

Year	N	Average Cash Ratio	Median Cash Ratio	sd Cash Ratio	Average Leverage	Median Leverage	sd Leverage
1986	333	0.102	0.066	0.101	0.054	0.053	0.096
1987	460	0.115	0.079	0.112	0.035	0.042	0.113
1988	539	0.112	0.082	0.108	0.051	0.05	0.108
1989	586	0.112	0.079	0.111	0.057	0.053	0.112
1990	616	0.106	0.073	0.115	0.063	0.06	0.140
1991	645	0.102	0.062	0.122	0.107	0.083	0.321
1992	670	0.100	0.064	0.11	0.118	0.093	0.297
1993	717	0.103	0.069	0.105	0.104	0.069	0.338
1994	715	0.111	0.072	0.111	0.097	0.063	0.253
1995	749	0.106	0.074	0.108	0.091	0.056	0.262
1996	1010	0.108	0.066	0.12	0.088	0.053	0.336
1997	1178	0.124	0.081	0.139	0.093	0.064	0.234
1998	1299	0.130	0.081	0.147	0.112	0.078	0.216
1999	1400	0.147	0.084	0.169	0.114	0.079	0.253
2000	1489	0.152	0.083	0.176	0.132	0.097	0.274
2001	1529	0.136	0.075	0.159	0.17	0.113	0.303
2002	1606	0.131	0.073	0.157	0.153	0.109	0.336
2003	1696	0.135	0.075	0.161	0.125	0.085	0.274
2004	1768	0.144	0.082	0.168	0.113	0.075	0.243
2005	1862	0.150	0.086	0.173	0.072	0.047	0.250
2006	1898	0.153	0.091	0.176	0.071	0.051	0.227
2007	1947	0.153	0.086	0.178	0.099	0.066	0.278
2008	1971	0.139	0.079	0.163	0.111	0.080	0.253
2009	2009	0.144	0.092	0.155	0.067	0.047	0.21
2010	2021	0.145	0.096	0.157	0.063	0.05	0.212
2011	2068	0.142	0.092	0.157	0.054	0.043	0.253
2012	2069	0.142	0.090	0.159	0.027	0.027	0.211
2013	2122	0.150	0.097	0.165	0.015	0.013	0.300

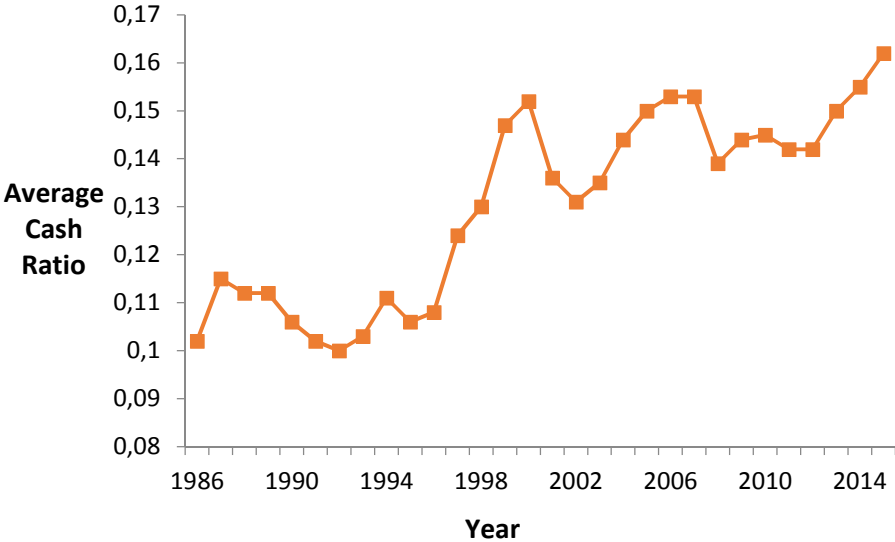| 2014 | 2059 | 0.155 | 0.104 | 0.165 | 0.033 | 0.036 | 0.216 |
| 2015 | 1909 | 0.162 | 0.106 | 0.175 | 0.025 | 0.030 | 0.220 |

Figure 1: Average cash ratio of European firms (1986-2015)

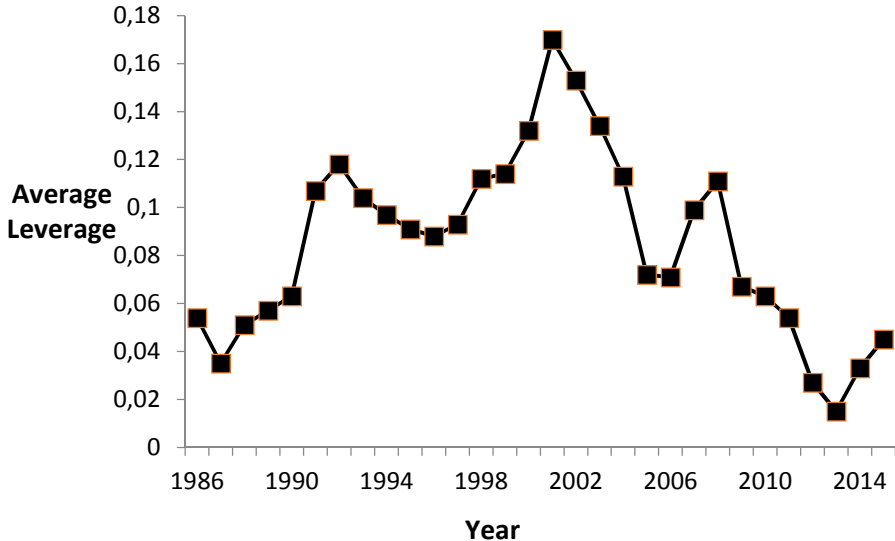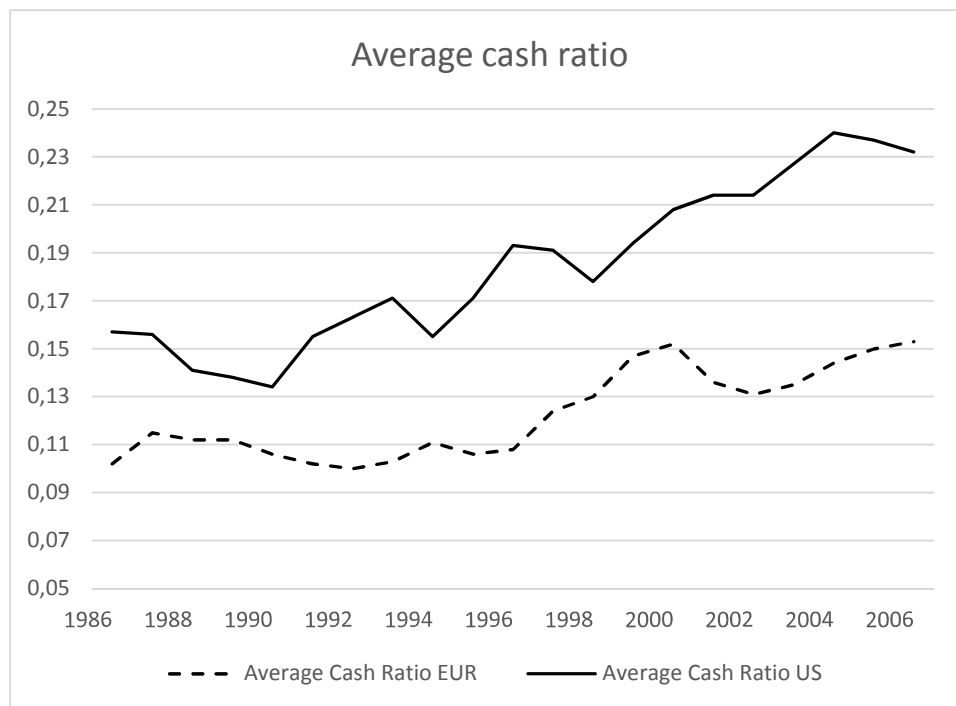**Figure 2: Average leverage of European firms (1986-2015)**

Figure 3: Comparison between European and US cash ratios (1986-2006)

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Average cash ratio

3.4. Trend analysis

To assess whether this increase in the cash ratio is statistically significant we have first estimated regressions of the cash ratio on a constant and time measured in years. We report in tables 7 the trend analysis we performed on each variable. For each variable we report the trend (bt), the standard deviation (sd) and the t-statistic. We also report the R^2 of the regression. In these tables we also report the cash ratio per size quintile (full sample and winzorised sample).

In a second time we will estimate this regression including a break in the series as to take into account the quick increase of the ratio between 1996 and 2000 (to be done). For the initial regression (no break), we report the results in table 7. The coefficient on the time trend for the average cash ratio indicates a yearly increase of 0.41% significant at the 1% level with a high R^2 of 76%. For the median, the slope coefficient is also significant at the 1% level indicating an increase by 0.29% per year. These results are consistent with a positive trend in cash holding. In tables 7 we also report similar results for different ranking factors such as IPO versus non IPO, dividend paying versus non-paying dividend firms.

Tables 2: Trend analysis. Regressions of Cash ratio per class on intercept (a) and trend (bt).

	Ave Cash Ratio	Med Cash Ratio	Ave Lev	Med Lev	IPO Firms	Non-IPO Firms	Div Payer	Non Div Payer	Neg NI	Non-Neg NI
a	-3.8141	-1.9744	1.6981	1.7556	-7.1198	-3.0451	-1.3872	-7.4412	-8.019	-2.9189
sd	0.4135	0.2912	1.6147	0.9666	0.9504	0.5319	0.3507	1.2245	1.5744	0.2652

-9.223	-6.7809	1.0517	1.8162	-7.4913	-5.7255	-3.9551	-6.0769	-5.0935	-11.0078
bt 0.002	0.001	-8,00E-04	-8,00E-04	0.0036	0.0016	8,00E-04	0.0038	0.0041	0.0015
sd 2,00E-04	1,00E-04	8,00E-04	5,00E-04	5,00E-04	3,00E-04	2,00E-04	6,00E-04	8,00E-04	1,00E-04
9.5383	7.0602	-0.9992	-1.7519	7.6512	5.9614	4.299	6.1911	5.1803	11.4871
R2 0.7647	0.6403	0.0344	0.0988	0.6765	0.5593	0.3976	0.5779	0.4894	0.8249

	Q1	Q2	Q3	Q4	Q5	1985	1995	2000	2005	2010
a	-2.0216	-3.7694	-6.1322	-9.1634	-18.5188	0.5661	-2.8656	-5.6613	-10.5354	-12.4645
sd	0.096	0.2125	0.42	0.6762	1.4889	0.2653	0.517	1.597	1.2658	1.7128
	-21.0562	-17.7351	-14.6021	-13.5521	-12.4376	2.1338	-5.5423	-3.545	-8.3229	-7.2773
bt	0.001	0.0019	0.0031	0.0046	0.0093	-2,00E-04	0.0015	0.0029	0.0053	0.0063
sd	0	1,00E-04	2,00E-04	3,00E-04	7,00E-04	1,00E-04	3,00E-04	8,00E-04	6,00E-04	9,00E-04
	21.3237	17.9119	14.7255	13.6643	12.5272	-1.7279	5.7819	3.6329	8.4266	7.3585
R2	0.942	0.9197	0.8856	0.8696	0.8486	0.0964	0.5442	0.3204	0.7172	0.6591

	AT	BE	DE	ES	FI	FR	GR	IE	IT	NL	PT
a	-2.8653	-5.1907	-8.4526	-3.1539	-1.5847	-3.9166	-0.4424	-5.5914	5.4167	-0.2236	-2.8201
sd	1.0006	0.6785	0.8635	0.7122	0.7481	0.3704	1.0879	1.105	0.7101	0.6635	0.5608
	-2.8636	-7.6502	-9.789	-4.4286	-2.1183	-10.5751	-0.4067	-5.0601	7.628	-0.337	-5.0287
bt	0.0015	0.0027	0.0043	0.0016	9,00E-04	0.002	3,00E-04	0.0029	-0.0026	2,00E-04	0.0014
sd	5,00E-04	3,00E-04	4,00E-04	4,00E-04	4,00E-04	2,00E-04	5,00E-04	6,00E-04	4,00E-04	3,00E-04	3,00E-04
	2.9615	7.8304	9.9579	4.5552	2.2892	10.9786	0.4823	5.2089	-7.4325	0.5138	5.1305
R2	0.2385	0.6865	0.7798	0.4256	0.1577	0.8115	0.0082	0.4921	0.6636	0.0093	0.4846

4.

Cash ratio per size quintile: Full sample

Size Q	Q1	Q2	Q3	Q4	Q5
A	-10.8998	-5.5269	-1.7293	0.2798	-1.0129
Sd	1.659	0.7049	0.3471	0.4486	0.2996
	-6.5701	-7.8409	-4.9819	0.6237	-3.3803
Bt	0.0055	0.0028	9,00E-04	-1,00E-04	6,00E-04
Sd	8,00E-04	4,00E-04	2,00E-04	2,00E-04	1,00E-04
	6.6737	8.0423	5.3331	-0.3779	3.7174
R2	0.6226	0.7055	0.513	0.0053	0.3385

Cash ratio per size quintile: Winzorised sample 1% (on size & cash)

Size Q	Q1	Q2	Q3	Q4	Q5
A	-10.1552	-5.0704	-1.7444	0.07	-1.2689
Sd	1.4949	0.5868	0.3299	0.4152	0.3172
	-6.7931	-8.6401	-5.2883	0.1685	-3.9999
Bt	0.0052	0.0026	9,00E-04	0	7,00E-04
Sd	7,00E-04	3,00E-04	2,00E-04	2,00E-04	2,00E-04

| | 6.8971 | 8.8672 | 5.6477 | 0.095 | 4.3221 |
| R2 | 0.6379 | 0.7444 | 0.5416 | 3,00E-04 | 0.4089 |

4. DO FIRMS CHARACTERISTICS HAVE AN IMPACT ON CASH HOLDINGS?

We now investigate in this section whether the increase in cash in European companies in the last 30 years can be explained by changes in the characteristics of firms. In order to do this, we split our sample into different sub-samples, for example dividend paying vs. non dividend paying firms, profitable vs. non profitable firms, etc., and we compare their respective behaviors in terms of cash holdings.

4.1. Firm size

We first look at firm size. Size is measured as the logarithm of the book value of total assets of sample firms. Firms are sorted in quintiles based on the size of the prior fiscal year (Tables 3 and 3b, Figure 4). Whereas the cash ratios of small and large firms are similar before 1996, our results show important differences linked to size during the 1996-2015 period, small firms showing much higher cash ratios than large firms. The result obtained for the 1996-2015 period is consistent with the precautionary motive for holding cash and confirms the result obtained by Bates et al. for US firms. Smaller firms tend to be riskier and to have a more difficult access to capital market, thus they tend to hold more cash. Our observations are confirmed by the statistical analysis. When we look at the trend in the cash ratio (Table 2), we see that the coefficient we obtain for each quintile increases almost linearly from the smallest corporations (0.55% for corporations belonging to Q1) to the largest corporations (0.06% for Q5).

Table 3: Average cash ratios by firm size quintile from 1987 to 2015 (size FY-1)

Quintiles are sorted on the size of the prior fiscal year. The first quintile (Q1) is comprised of the smallest firms in the sample while the fifth (Q5) is comprised of the largest firms in the sample. Size stands for the mean firm log size for each year.

| | Full sample | | | | | |
	Q1	Q2	Q3	Q4	Q5	SIZE
1987	0,095	0,101	0,124	0,106	0,101	13.237
1988	0,09	0,122	0,116	0,116	0,104	12.687
1989	0,105	0,122	0,113	0,119	0,105	12.539
1990	0,099	0,12	0,096	0,126	0,095	12.577
1991	0,1	0,098	0,103	0,109	0,093	12.654
1992	0,099	0,099	0,109	0,114	0,086	12.703
1993	0,091	0,11	0,11	0,116	0,095	12.679
1994	0,1	0,111	0,128	0,122	0,102	12.628
1995	0,095	0,095	0,122	0,116	0,099	12.664
1996	0,099	0,114	0,099	0,12	0,098	12.683
1997	0,151	0,105	0,117	0,113	0,101	12.043
1998	0,188	0,123	0,127	0,102	0,097	11.848
1999	0,25	0,144	0,128	0,108	0,091	11.842

2000	0,244	0,164	0,126	0,097	0,09	11.987
2001	0,194	0,172	0,123	0,103	0,091	12.152
2002	0,183	0,157	0,12	0,094	0,093	12.149
2003	0,194	0,161	0,117	0,095	0,103	12.019
2004	0,218	0,171	0,12	0,099	0,105	11.927
2005	0,243	0,166	0,125	0,096	0,106	11.898
2006	0,251	0,171	0,125	0,105	0,099	11.945
2007	0,252	0,169	0,136	0,104	0,099	12.038
2008	0,205	0,156	0,124	0,103	0,092	12.154
2009	0,19	0,177	0,126	0,11	0,107	12.182
2010	0,198	0,159	0,134	0,114	0,112	12.145
2011	0,195	0,159	0,128	0,109	0,109	12.199
2012	0,193	0,16	0,13	0,106	0,11	12.264
2013	0,194	0,17	0,13	0,117	0,117	12.222
2014	0,221	0,17	0,134	0,128	0,115	12.182
2015	0,243	0,17	0,145	0,131	0,114	12.346

Figure 4: Average cash ratios by firm size quintile from 1987 to 2015 (size FY-1)

Quintiles are sorted on the size of the prior fiscal year. The first quintile (Q1) is comprised of the smallest firms in the sample while the fifth (Q5) is comprised of the largest firms in the sample.

Table 3b: Average cash ratios by firm size quintile from 1987 to 2015 (size FY-1)

Quintiles are sorted on the size of the prior fiscal year. The first quintile (Q1) is comprised of the smallest firms in the sample while the fifth (Q5) is comprised of the largest firms in the sample.
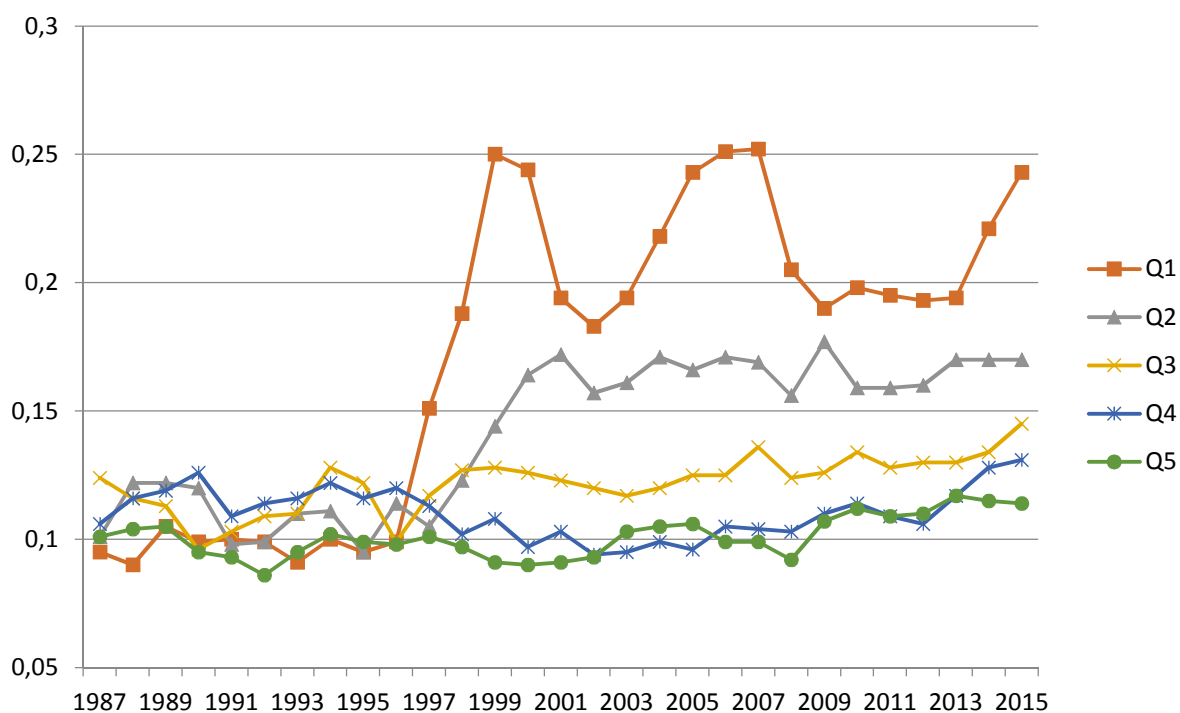
	Winzorised sample 1% (on size & cash)				
	Q1	**Q2**	**Q3**	**Q4**	**Q5**
1987	0.092	0.096	0.117	0.095	0.098
1988	0.093	0.113	0.109	0.110	0.108
1989	0.095	0.119	0.104	0.12	0.103
1990	0.08	0.117	0.097	0.122	0.095
1991	0.076	0.093	0.103	0.112	0.089
1992	0.086	0.094	0.105	0.112	0.084
1993	0.085	0.101	0.112	0.113	0.098
1994	0.092	0.104	0.127	0.121	0.103
1995	0.085	0.095	0.112	0.113	0.099
1996	0.088	0.109	0.096	0.116	0.099
1997	0.125	0.1	0.115	0.114	0.103
1998	0.158	0.119	0.126	0.105	0.099
1999	0.22	0.136	0.126	0.109	0.093
2000	0.218	0.158	0.125	0.099	0.09
2001	0.18	0.153	0.12	0.105	0.093
2002	0.18	0.138	0.114	0.096	0.093
2003	0.18	0.144	0.113	0.097	0.105
2004	0.198	0.154	0.119	0.101	0.106
2005	0.216	0.158	0.122	0.094	0.11
2006	0.229	0.156	0.126	0.105	0.1
2007	0.229	0.158	0.133	0.105	0.1
2008	0.19	0.143	0.12	0.102	0.095
2009	0.184	0.161	0.119	0.11	0.109
2010	0.182	0.15	0.13	0.112	0.115
2011	0.173	0.155	0.122	0.11	0.111
2012	0.172	0.153	0.128	0.104	0.113
2013	0.174	0.164	0.129	0.115	0.119
2014	0.2	0.161	0.13	0.127	0.117
2015	0.225	0.16	0.139	0.129	0.117

4.2. Recent IPO status

We then consider the IPO status of firms. As a matter of fact, there was an increase in the number of IPOs in Europe during our observation period and recently IPOed firms might have more cash because of the cash raised at the IPOs and at the SEOs they may perform in the following years. For each year, we classify our sample into two sub-samples. IPO firms correspond to recent IPOs, i.e. firms that were made public during the 5 years before the year of observation. Non-IPO firms are the other firms.

We find that, from 1996 to 2000, the cash ratios of both sub-samples are close and strongly increase (Table 4, Figure 5). The average cash ratio of IPO firms increases from 11.5% in 1996 to 14.6% to in 2000 (the ratios are, respectively, 10.7 and 15.5% for Non IPO firms). After 2000, the cash ratio of IPO firms continue to increase and reaches 23.8% in 2015, whereas the cash ratio of Non IPO firms declines and remains much lower than the one of IPO firms until the end of our observation period. Therefore, the fact that the cash ratio in our whole sample is higher in the 2001-2015 period than it was before can be explained by a larger proportion of recently IPOed firms that have higher cash ratios. However, it seems that the sharp increase in cash during the 1996-2000 period in our sample cannot be explained by a higher proportion of recent IPOs, as IPO firms and Non IPO firms both experience a similar increase in cash during these years.

Table 4: Average cash ratios from 1986 to 2015 delineated by new issue status, the payment of dividends, and accounting performance.

	New Issues		Dividend Status		Accounting Performance	
Year	IPO Firms	Non-IPO Firms	Dividend Payer	Non Dividend Payer	Negative Net Income	Non-Negative Net Income
1986	0,128	0,100	0,117	0,078	0,093	0,103
1987	0,162	0,110	0,126	0,091	0,076	0,119
1988	0,134	0,109	0,122	0,081	0,066	0,116
1989	0,107	0,114	0,116	0,103	0,068	0,116
1990	0,098	0,111	0,109	0,097	0,075	0,110
1991	0,102	0,103	0,108	0,081	0,073	0,109
1992	0,093	0,105	0,110	0,075	0,065	0,109
1993	0,094	0,109	0,115	0,077	0,067	0,113
1994	0,110	0,111	0,123	0,081	0,071	0,117
1995	0,121	0,103	0,113	0,088	0,084	0,109
1996	0,115	0,107	0,110	0,104	0,114	0,107
1997	0,119	0,125	0,115	0,138	0,150	0,120
1998	0,128	0,130	0,118	0,154	0,157	0,125
1999	0,130	0,154	0,127	0,182	0,199	0,136
2000	0,146	0,155	0,116	0,205	0,221	0,133
2001	0,170	0,109	0,107	0,181	0,177	0,120
2002	0,173	0,103	0,108	0,164	0,158	0,118
2003	0,178	0,112	0,115	0,168	0,152	0,128
2004	0,190	0,127	0,119	0,181	0,175	0,135
2005	0,177	0,144	0,119	0,186	0,196	0,138

2006	0,167	0,151	0,117	0,195	0,216	0,138
2007	0,193	0,145	0,117	0,199	0,215	0,137
2008	0,176	0,129	0,116	0,170	0,157	0,131
2009	0,178	0,135	0,131	0,156	0,147	0,141
2010	0,178	0,137	0,135	0,151	0,146	0,144
2011	0,171	0,136	0,129	0,153	0,136	0,145
2012	0,157	0,140	0,131	0,153	0,140	0,143
2013	0,210	0,145	0,142	0,154	0,146	0,153
2014	0,214	0,150	0,142	0,167	0,167	0,149
2015	0,238	0,153	0,145	0,181	0,188	0,150

**Figure 5: Average cash ratios from 1986 to 2015 delineated by new issue status**
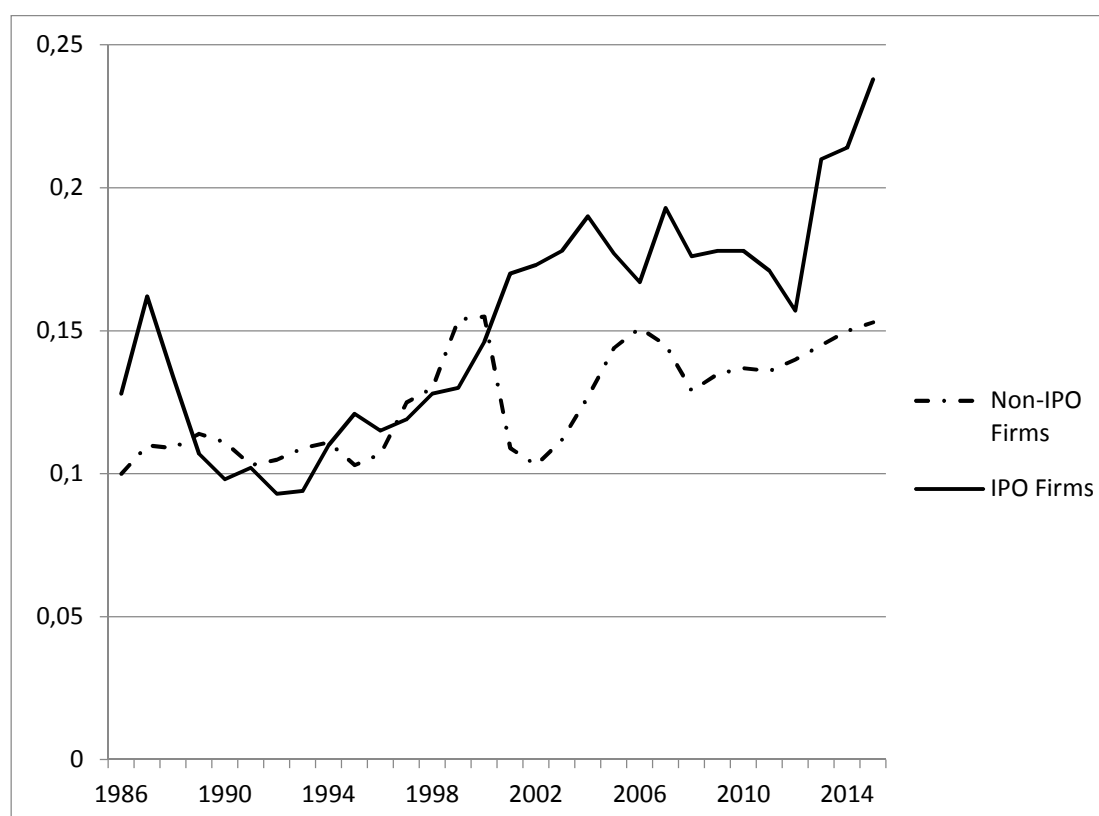
4.3. Dividend status

We now turn to the dividend status of firms. For each fiscal year, we divide the sample into two sub-samples, dividend paying and non-dividend paying firms. As shown in table 3 and figure 6, the average cash ratio of dividend paying firms is rather stable along time. It fluctuates between 10.7 and 12.7% during the 1986-2008 time period, then moderately increases up to 14.5% in 2015. This could be

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explained by the fact that these firms disgorge cash by paying dividends. The average cash ratio of non dividend payers follows a totally different trend. It is lower than the cash ratio of dividend payers during the 1986-1996 period, then it rapidly increases between 1997 and 2000, and remains in a 15-20% range, which is much higher than dividend payers, during the 2000-2015 period. It therefore seems that the strong increase in cash holdings in our sample of European firms from 1997 is linked to a change of behavior of non dividend payers, who started to accumulate more cash in the end of the 90's.

Non dividend paying firms are generally considered as financially constrained (Almeida, Campello and Weisbach (2004), and are therefore expected to have higher cash holdings according to the precautionary motive for holding cash. Consistent with this hypothesis, Bates et al. find that non dividend paying firms in the US had higher cash ratios than dividend payers during their whole observation period (1980-2006) and that they experienced a strong increase in cash holdings during this period (from 13% in 1980 to 27.7% in 2006), therefore supporting the precautionary motive. Our findings give a mix support to the precautionary motive, as non dividend paying firms have lower cash ratios between 1986 and 1996, but higher cash ratios from 1997.

**Figure 6: Average cash ratios from 1986 to 2015 delineated by the payment of dividends**
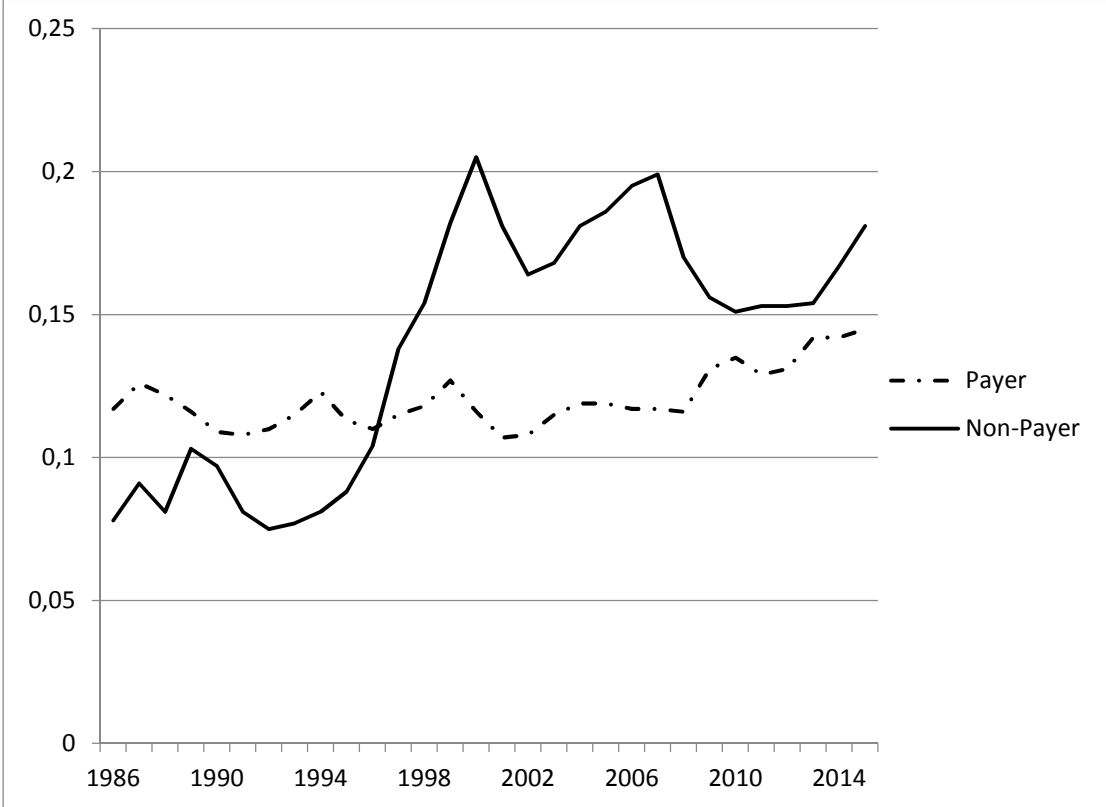
4.4. Profitability status

We now look at the profitability status of firms. For each year, our sample is divided into two subsamples depending on whether the firm makes a negative or a positive net income. The average cash ratio of profitable firms is at first rather stable, within a 10.3% - 11.9% range, from 1986 to 1996. It then moderately increases and reaches 15% in 2015 (figure 7). The cash ratio of loss making firms follows a much more irregular pattern but, starting 1997, it remains higher than the one of profitable firms until

2015. Loss making firms tend to be more financially constrained and more sensitive to adverse shocks than profitable firms.

According to the precautionary motive for holding cash, they are therefore expected to have more cash than profitable firms. Even if the impact of losses might be to reduce cash flow and, therefore, cash holdings, non-profitable firms can be tempted to accumulate more cash to prevent the consequences of adverse events. Similarly to the results of Bates et al for US firms, our findings provide a support for the precautionary motive. They also show that the average cash holdings of loss making firms are much more volatile than those of profitable firms. The cash holdings of loss making European firms seem to be strongly impacted by economic shocks. For example they increase sharply between 1995 and 2000 (internet "bubble"), then decrease, increase again from 2004 to 2007, then decrease during the 2008 financial crisis, then increase again from 2013.

Figure 7: Average cash ratios from 1986 to 2015 delineated by accounting performance
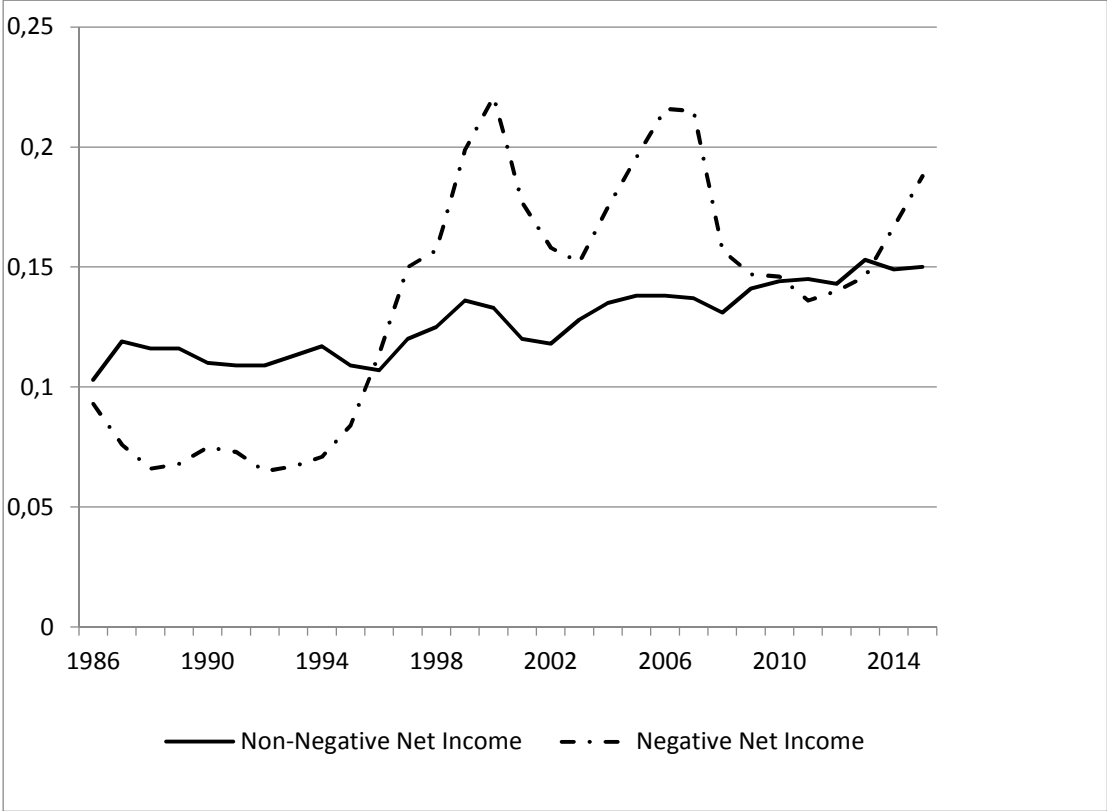
4.5. Idiosyncratic risk

According to the precautionary motive for holding cash, firms operating in industries with a higher idiosyncratic risk are expected to have more cash, in order to be able to better cope with risk. We measure industry idiosyncratic risk as the average cash flow risk of the firms belonging to a given industry. Our industry classification is based on two digits SIC codes. For a given year, firm cash flow risk is computed as the standard deviation of the cash flow to assets ratio for the 10 years preceding the observation. As in Bates et al., we require at least three observations. We then average the cash flow risks of all firms belonging to a given SIC code to calculate the industry cash flow risk. For each year, our sample is divided into five quintiles sorted by the values of industry cash flow risk. As can be seen in table 5 and figure 8, the average cash ratios of the five quintiles have similar values until 1996. They then start to

diverge. The cash ratios of firms belonging to riskier industries, particularly Q5 and Q4, see a dramatic increase and remain largely above the cash ratios of firms belonging to less risky industries. The latter firms, contrarily to riskier firms, do not experience a clear growth pattern in their cash ratios along the period. Thus, our results provide support for the precautionary motive for holding cash.

Table 5: Average cash ratios from 1986 to 2015 by SD CF to assets SIC quintile.

Quintiles are sorted on the SD CF to assets SIC of the current year. The first quintile (Q1) is comprised of the firms with the lowest SD CF to assets SIC in the sample while the fifth (Q5) is comprised of the firms the largest SD CF to assets SIC in the sample.

SD CF Q	Q1	Q2	Q3	Q4	Q5
1986	0,089	0,092	0,118	0,105	0,098
1987	0,108	0,102	0,130	0,120	0,115
1988	0,106	0,109	0,117	0,111	0,109
1989	0,100	0,106	0,120	0,105	0,123
1990	0,100	0,117	0,098	0,096	0,120
1991	0,107	0,093	0,107	0,095	0,117
1992	0,098	0,097	0,095	0,106	0,104
1993	0,103	0,108	0,104	0,118	0,100
1994	0,111	0,123	0,105	0,114	0,108
1995	0,108	0,111	0,092	0,105	0,108
1996	0,100	0,110	0,101	0,100	0,127
1997	0,123	0,125	0,113	0,120	0,145
1998	0,131	0,113	0,110	0,127	0,168
1999	0,155	0,124	0,107	0,185	0,207
2000	0,135	0,129	0,119	0,202	0,236
2001	0,113	0,112	0,107	0,137	0,212
2002	0,107	0,099	0,133	0,181	0,193
2003	0,103	0,106	0,104	0,183	0,209
2004	0,110	0,087	0,131	0,185	0,231
2005	0,121	0,107	0,141	0,211	0,210
2006	0,116	0,115	0,149	0,199	0,204
2007	0,120	0,135	0,151	0,186	0,193
2008	0,108	0,115	0,128	0,195	0,172
2009	0,110	0,113	0,143	0,174	0,187
2010	0,109	0,121	0,147	0,174	0,183
2011	0,113	0,114	0,135	0,167	0,166
2012	0,110	0,112	0,140	0,166	0,170
2013	0,116	0,117	0,161	0,177	0,188
2014	0,116	0,115	0,168	0,184	0,193
2015	0,124	0,102	0,180	0,185	0,215

Figure 8: Average cash ratios from 1986 to 2015 by SD CF to assets SIC quintile.

Quintiles are sorted on the SD CF to assets SIC of the current year. The first quintile (Q1) is comprised of the firms with the lowest SD CF to assets SIC in the sample while the fifth (Q5) is comprised of the firms the largest SD CF to assets SIC in the sample.

Table 5b: Average cash ratios from 1986 to 2015 by SD CF to assets SIC quintile (winzorised 1% by cash and SD CF).

Quintiles are sorted on the SD CF to assets SIC of the current year. The first quintile (Q1) is comprised of the firms with the lowest SD CF to assets SIC in the sample while the fifth (Q5) is comprised of the firms the largest SD CF to assets SIC in the sample.
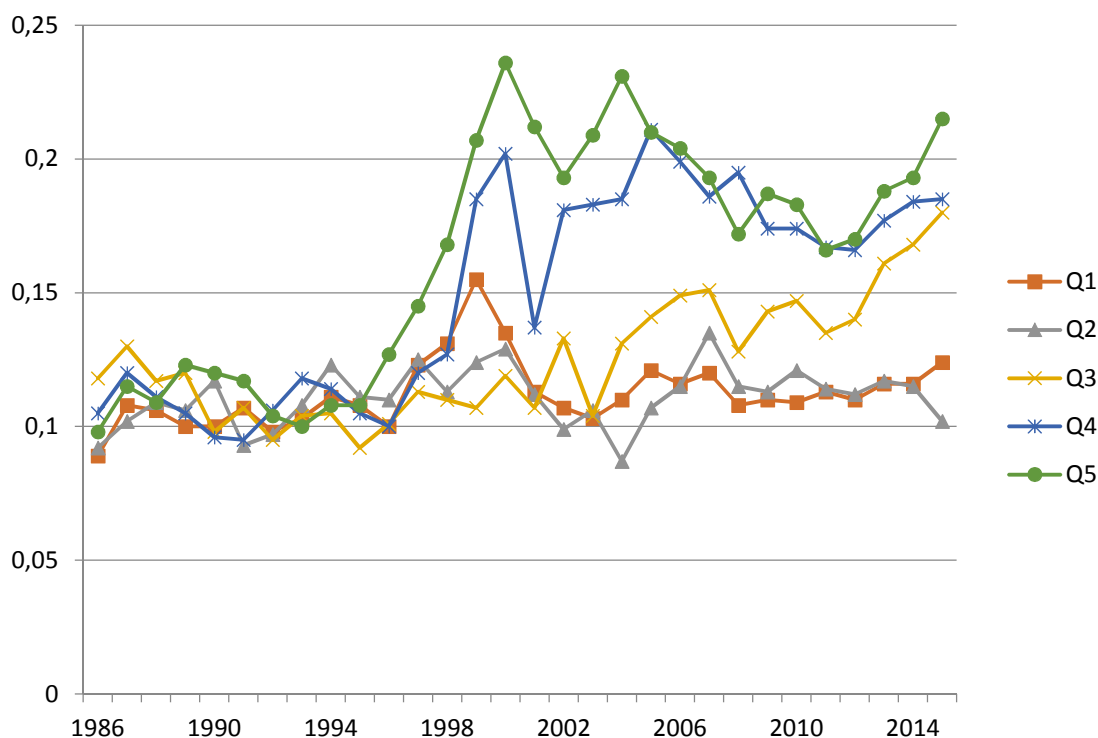
	Winzorised sample 1% (on SD CF & cash)				
SD CF Q	Q1	Q2	Q3	Q4	Q5
1986	0,023	0,024	0,022	0,025	0,020
1987	0,031	0,027	0,024	0,030	0,023
1988	0,032	0,036	0,043	0,035	0,032
1989	0,037	0,038	0,032	0,042	0,038
1990	0,037	0,041	0,040	0,036	0,041
1991	0,049	0,051	0,040	0,048	0,050
1992	0,049	0,051	0,050	0,049	0,047
1993	0,099	0,086	0,104	0,106	0,101
1994	0,104	0,095	0,095	0,107	0,102
1995	0,089	0,101	0,076	0,098	0,095
1996	0,076	0,087	0,077	0,082	0,083
1997	0,082	0,083	0,075	0,081	0,085

1998	0,074	0,072	0,073	0,076	0,081
1999	0,076	0,067	0,066	0,068	0,078
2000	0,068	0,06	0,063	0,067	0,075
2001	0,075	0,072	0,078	0,082	0,085
2002	0,087	0,079	0,086	0,094	0,105
2003	0,082	0,088	0,090	0,104	0,112
2004	0,105	0,085	0,111	0,122	0,142
2005	0,102	0,088	0,099	0,114	0,126
2006	0,088	0,092	0,091	0,102	0,107
2007	0,099	0,105	0,107	0,108	0,122
2008	0,095	0,085	0,095	0,114	0,113
2009	0,099	0,102	0,100	0,122	0,120
2010	0,099	0,102	0,109	0,124	0,126
2011	0,105	0,106	0,114	0,137	0,133
2012	0,127	0,129	0,163	0,183	0,188
2013	0,138	0,141	0,185	0,198	0,208
2014	0,137	0,137	0,192	0,205	0,217
2015	0,137	0,118	0,191	0,194	0,232

4.6. Are there differences between European countries?

The average cash ratios of Eurozone countries (1986-2015) are given in Table 6. As one may observe, the behavior of European companies in terms of cash holdings are very different over the total period given their nationality.

In order to visualize these different patterns we show in Figure 9 the evolution of cash ratios for the main Eurozone countries: France (FR), Germany (DE), Italy (IT) and Spain (ES). As one may see, the cash ratios of French firms increase steadily, as for Germany, and are significantly higher than the ones of Italy and Spain. On the contrary, Italy experiences a sharp decrease in cash over the period. Up to now, it is difficult to explain such different behaviors.

Table 6: Average cash ratios from 1986 to 2015 by country.

Year	AT	BE	DE	ES	FI	FR	GR	IE	IT	NL	PT
1986	0.029	0.081	0.107	0.063	0.097	0.116	0.066	0.106	0.177	0.103	0.012
1987	0.028	0.105	0.099	0.119	0.102	0.14	0.071	0.119	0.193	0.124	0.087
1988	0.041	0.109	0.094	0.1	0.116	0.136	0.088	0.085	0.202	0.111	0.032
1989	0.098	0.104	0.092	0.083	0.119	0.136	0.066	0.135	0.19	0.118	0.045
1990	0.099	0.095	0.088	0.059	0.107	0.13	0.059	0.13	0.185	0.117	0.038
1991	0.12	0.082	0.078	0.06	0.101	0.138	0.09	0.161	0.163	0.105	0.053
1992	0.074	0.092	0.084	0.052	0.104	0.134	0.064	0.153	0.156	0.105	0.056
1993	0.078	0.107	0.091	0.067	0.114	0.129	0.051	0.159	0.148	0.114	0.033
1994	0.105	0.111	0.098	0.065	0.136	0.136	0.085	0.129	0.147	0.117	0.029
1995	0.115	0.095	0.095	0.067	0.127	0.127	0.074	0.123	0.138	0.122	0.035
1996	0.105	0.099	0.105	0.071	0.119	0.128	0.064	0.144	0.126	0.116	0.063
1997	0.124	0.132	0.13	0.077	0.118	0.141	0.078	0.14	0.123	0.128	0.057

1998	0.123	0.14	0.137	0.085	0.133	0.141	0.099	0.17	0.125	0.128	0.048
1999	0.143	0.102	0.175	0.08	0.161	0.147	0.158	0.139	0.13	0.121	0.053
2000	0.121	0.093	0.178	0.094	0.172	0.142	0.168	0.176	0.175	0.111	0.047
2001	0.108	0.083	0.165	0.081	0.151	0.135	0.116	0.195	0.14	0.118	0.049
2002	0.095	0.105	0.166	0.085	0.14	0.14	0.081	0.17	0.123	0.101	0.057
2003	0.086	0.129	0.169	0.085	0.147	0.145	0.077	0.177	0.117	0.119	0.065
2004	0.085	0.146	0.18	0.108	0.154	0.152	0.07	0.217	0.116	0.145	0.061
2005	0.097	0.133	0.195	0.124	0.143	0.16	0.06	0.202	0.13	0.143	0.069
2006	0.101	0.144	0.198	0.119	0.143	0.162	0.068	0.249	0.127	0.143	0.062
2007	0.089	0.15	0.196	0.109	0.138	0.166	0.076	0.23	0.127	0.136	0.069
2008	0.095	0.143	0.177	0.08	0.127	0.157	0.077	0.185	0.115	0.093	0.058
2009	0.117	0.143	0.18	0.092	0.13	0.169	0.083	0.169	0.103	0.109	0.061
2010	0.106	0.144	0.187	0.107	0.109	0.169	0.077	0.183	0.107	0.089	0.08
2011	0.106	0.137	0.176	0.112	0.116	0.17	0.074	0.185	0.105	0.09	0.085
2012	0.1	0.158	0.18	0.101	0.114	0.168	0.074	0.171	0.106	0.108	0.077
2013	0.109	0.151	0.186	0.114	0.121	0.181	0.078	0.16	0.119	0.12	0.078
2014	0.12	0.163	0.185	0.116	0.131	0.19	0.085	0.192	0.122	0.116	0.074
2015	0.119	0.192	0.181	0.128	0.146	0.197	0.092	0.179	0.132	0.15	0.08

Figure 9: Average cash ratios from 1986 to 2015 for the main Eurozone countries
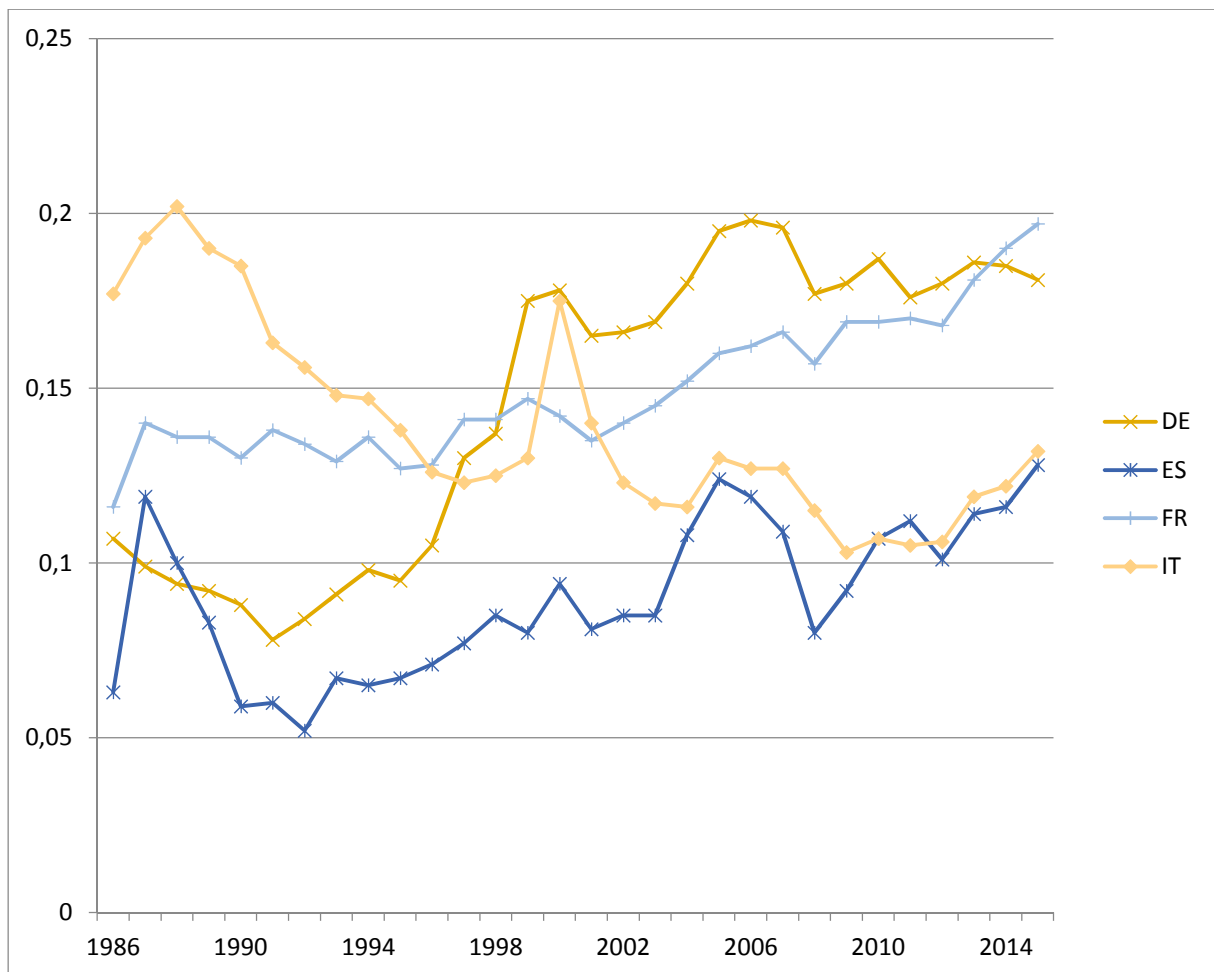
5. WHAT ARE THE FACTORS EXPLAINING THE CASH HOLDINGS OF EUROPEAN FIRMS?

In this section, we examine whether the increase in cash holdings can be explained by firm characteristics (Table 8). Our first panel regression (Equation 1) relates the cash ratio to the variable defined above (FC stands for the vector of firm characteristics). To control for potential outliers we report the results on the full sample and on a sample in which we have winzorised the data at the 1% level. Our dependent variable is the cash to assets (column one - OLS(1) -).

$$Cash_{j,t} = a + FC_{j,t} + \epsilon_{j,t} \qquad (1)$$

In column 2 and 3 of Table 8, we reproduce the model with the log of the cash to assets (column two - OLS(2) -) or the changes in the Cash to assets (column three -OLS(3) -) as dependent variables.

We find that cash flow risk (industry sigma), the ratio of R&D to sales and Market to book have positive and significant coefficients. All other variables have negative and significant coefficients as expected. The only exception is leverage which exhibits a positive coefficient. Our conclusions are similar whether we look at the ratio of cash to assets, to the log of the ratio, to changes or to the winzorised panels. However, we note that cash flow risk and Market to book are not significant with changes while leverage exhibits now the correct coefficient. All these regressions produce non-zero R^2 which are in line the ones obtained by Bates et al. (2009) for the US.

Table 7: Regressions estimating the determinants of cash holdings.

We report the coefficient for each variable and the p-value into brackets.

Model	OLS (1)		OLS(2)		Changes	
		1%		1%		1%
	full sample	winzorised	full sample	winzorised	full sample	winzorised
Dependent variable	Cash/assets	Cash/assets	log(Cash/net assets)	log(Cash/net assets)	Cash/assets	Cash/assets
Intercept	0.274**	0.212**	-1.875**	-2.482**	0.015	0.015
	(0)	(0)	(0)	(0)	(0.06)	(0.063)
Lag dcash					-0.33**	-0.321**
					(0)	(0)
Lag cash					0.089**	0.087**
					(0)	(0)
Sigma	0.116*	0.217**	1.299*	2.671**	-0.061	-0.176
	(0.024)	(0.001)	(0.005)	(0)	(0.73)	(0.482)
Market to book	0.006**	0.026**	0.05**	0.206**	-0.002	0.01
	(0.001)	(0)	(0.005)	(0)	(0.856)	(0.54)
Size	-0.009**	-0.008**	-0.026	-0.012	-0.124**	-0.135**
	(0)	(0)	(0.217)	(0.563)	(0.002)	(0.001)
CF/Assets	-0.11**	0.135**	-0.672**	1.19**	0.406**	0.756**
	(0)	(0.005)	(0.007)	(0.009)	(0)	(0)
NWC/Assets	-0.025	-0.054*	0.236	0.124	-0.815**	-1.147**
	(0.301)	(0.037)	(0.29)	(0.612)	(0)	(0)
Capex	-0.54**	-0.734**	-5.23**	-6.292**	-1.595**	-2.259**
	(0)	(0)	(0)	(0)	(0)	(0)

Leverage	0.114**	0.14**	0.919**	1.295**	-0.297**	-0.411**
	(0)	(0)	(0)	(0)	(0)	(0)
R&D/sales	0**	0.15**	0.002**	0.986**	0.001	0.053
	(0)	(0)	(0.003)	(0)	(0.499)	(0.303)
Div	-0.029*	-0.02	-0.154	-0.112	0.042	0.06*
	(0.018)	(0.078)	(0.166)	(0.296)	(0.116)	(0.026)
Adj. R²	0,3802	0,2106	0,135	0,2445	0,0984	0,1104

Variables with two stars ** are significant at the 1% level. Variables with one star * are significant at the 5% level.

6. CONCLUSION AND FUTURE RESEARCH

In this research we document a very important increase from 1986 through 2015 in the average cash ratio for European industrial and commercial firms. This finding is coherent with the one of Bates et al. (2009). We show that this increase is concentrated among small firms, firms that do not pay dividends, loss making firms and firms having a high idiosyncratic risk.

It seems that cash ratios increase because firms' cash flows become riskier over the period. Among the different theories, it appears that the precautionary motive for cash holdings plays an important role in explaining the increase in cash ratios of European companies over the period 1986-2015.

Though the market for derivatives has grown dramatically (especially for foreign exchange risks), our evidence suggests that firms face many risks that they cannot hedge or are reluctant to hedge with derivatives. As a matter of facts, our period of study (1986-2015) is interesting because of the two big shocks: the first in 2000 with the explosion of the Internet bubbles and in 2008 with the subprime crisis. Taking in account these events it appears that the management of European companies, especially the small ones, tend to be more conservative and hold more cash as a precautionary motive.

We also document a different financing policy between US and European firms over the sample period. Whereas Bates et al. (2009) observe a dramatic decrease in net debt for US firms over their sample period (1980-2006), the average leverage of European firm shows two successive trends. It first strongly increases from 1986 to 2001 and then sharply decreases between 2001 and 2015. We may suspect that the decrease in leverage over the last 15 years may be explained by the use of cash to decrease debt. This could explain why we observe a stabilization of the cash ratio over this period.

One reason why firms may hold cash is the lack of profitable investment opportunities, so in a future research we would like to test whether firms having high growth opportunities do hold less cash than the one having low growth opportunities. We also intend to explore if the IPO status of firms has an impact on the cash holdings.

In a future research, we intend to explore the impact of the tax and agency motives for holding cash on European companies.

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APPENDIX 1: VARIABLES DEFINITIONS

Variable name	Type	Measure	Level of measure	Main reference
Cash to assets ratio	Dependent	Cash & Cash equivalents / Total Assets	Firm	Bates et al.
Cash to net assets ratio	Dependent	Cash & Cash equivalents / Net Assets (Net assets = total assets – cash & cash equivalents)	Firm	Dittmar et al. (2003) Opler et al.
Cash to market cap. ratio	Dependent	Cash & cash equiv. to market capitalization	Firm	
Dividend dummy	Independent Precautionary motive	1 if div paid during FY; 0 if no div paid during FY. NA if no information.	Firm	Ferreira & Vilela 2004 Opler et al. (1999) Bigelli et SV (2012) Dittmar et al. (2003) Bates et al. (2009)
Sales growth (5 years)	Independent Precautionary motive Growth opportunities		Firm	Dittmar et al. (2003)
Tobin's Q	Independent Precautionary motive Growth opportunities	Enterprise value / total assets	Firm	Dittmar et al. (2003) Bates et al.
R&D to sales	Independent Precautionary motive Growth opportunities	R&D/Sales (NA when R&D is missing)	Firm	Bates et al. (2009) Opler et al. (1999) Bigelli et SV (2012) Dittmar et al. (2003)
Capex to assets	Independent Precautionary motive Growth opportunities	Capital expenditures / total assets	Firm	Opler et al. (1999) Bates et al.
Cash flow to assets	Independent	(Net Income + depreciation - dividends)/(total assets)	Firm	Bates et al.

SD CF to assets SIC (Industry cash flow risk)	Independent Precautionary motive Risk	Average of SDs of firm cash flow to total assets (10 years before current FY), for all firms in a given industry (two digits SIC code)	Industry	Bates et al. (2009) See page 1996 for method
Price volatility	Independent Precautionary motive Risk	Stock price volatility on one year	Firm	
Loss Dummy	Independent Precautionary motive	1 if net income is negative, 0 if it is not	Firm	Bates et al. (2009)
Size	Independent Transaction and precautionary motives	Ln (Book Value of Total Assets)	Firm	Dittmar et al. (2003)
Net WCR to assets	Independent Transaction motive (cash substitute)	(Current assets minus cash minus current liabilities) /total assets	Firm	Bigelli et SV (2012) Opler et al. (1999) Gao et al. (2013)
Leverage	Independent	Total debt / total assets	Firm	Ferreira & Vilela 2004
CEO Chairman	Independent Agency motive (entrenchment)	Dummy : 1 if the chairman IS or HAS BEEN the CEO, otherwise 0	Firm	Lins et al. (2010)
Shareholders rights	Independent Agency motive		Country	
Foreign sales to total sales	Independent Tax motive	% of revenue from non domestic countries	Firm	WC08731 International Sales / Net Sales or Revenues * 100 /100
Equity issuance	Control variable	(Equity issuance) / total assets	Firm	Bates et al. (2009)
Net debt issuance to assets	Control variable	(total debt N – total debt N-1) / total assets	Firm	Bates et al. (2009)
IPO DATE	Control variable		Firm	
IPO Cohort	Control variable	One value per firm: 1985 if IPO in 1989 or before 1990 if IPO btw 90 to 94 1995 if IPO btw 95 to 99… 2010 if IPO btw 2010 and 2015	Firm	Bates et al. (2009)

IPO 1 to 5 years	Control variable	(1 if firm went public in year N-1, 2 if firm went public in year N-2,…5), 0 in no IPO in the last five years. N is the year of observation	Firm	Bates et al. (2009)
Local index Volatility	Control variable		Country	
Tax rate	Control variable	Tax rate		