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Cash holdings and the performance of European mutual funds

Frank Graef[a], Pascal Vogt[b], Volker Vonhoff[c], Florian Weigert[*,d]

[a] University of St. Gallen, Unterer Graben 21, St. Gallen 9000, Switzerland
[b] Boston Consulting Group (BCG), Im Mediapark 8, Cologne 50670, Germany
[c] Boston Consulting Group (BCG), 10 Hudson Yards, New York, NY 10001, USA
[d] School of Finance, Swiss Institute of Banking and Finance, University of St. Gallen, Unterer Graben 21, St. Gallen 9000 Switzerland

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ABSTRACT

We investigate the determinants and performance implications of cash holdings for a large sample of actively-managed equity funds domiciled in the European Union (EU). In line with recent evidence from the US, we observe that cash holdings are strongly influenced by a fund's fee structure, past flows and flow volatility, and a fund's investment strategy. EU Funds with cash holdings in excess of the level predicted by fund attributes (i.e., high abnormal cash funds) earn higher risk-adjusted returns of 0.48% than their low abnormal cash peers over the subsequent six-months period. However, this outperformance disappears after 12–months.

1. Introduction

Cash is a crucial component of actively-managed mutual funds' portfolios. At the end of 2016, total worldwide assets invested in regulated open-end mutual funds exceeded USD 40 trillion – with more than USD 12 trillion invested in funds domiciled in the European Union (Investment Company Factbook, 2017). At the same point in time, funds domiciled in the European Union (i.e., EU funds) hold 3.31% of their total net assets (TNA) in cash which corresponds to a total amount of more than USD 410 billion. Interestingly, cash holdings considerably differ among seemingly comparable funds. As an example, one quintile of EU equity funds with a growth objective held over 8.04% of their TNA in cash at the end of 2016, while another quintile only held 0.17%. How can these differences be explained, and do these differences also translate into significant spreads in future fund performance?[1]

Despite their practical importance on fund returns and stability, cash holdings of EU equity funds have received no direct attention in the academic literature where previous studies have exclusively focused on the US market. Chordia (1996) and Yan (2006) investigate the link between cash holdings and a number of fund characteristics. They find, among others, that cash holdings increase with uncertainty about investor redemptions and decrease with load fees (Chordia, 1996), and that cash is positively correlated with a fund's expense ratio, past flows and flow volatility (Yan, 2006). More recently, Simutin (2014) examines the relationship between abnormal cash – i.e., cash holdings in excess of the level predicted by fund attributes – and US funds' future performance. Against the notion that cash holdings impose severe opportunity costs (since they prevent investments into equity), Simutin (2014) finds that US equity funds with high abnormal cash holdings outperform their low abnormal cash counterparts by roughly 2% per annum. He

* Corresponding author.
E-mail addresses: frank.graef@student.unisg.ch (F. Graef), vogt.pascal@bcg.com (P. Vogt), vonhoff.volker@bcg.com (V. Vonhoff), florian.weigert@unisg.ch (F. Weigert).

[1] These questions are also important from a normative perspective. For a theoretical model of optimal cash holdings that balances expected trading costs of redemptions with the opportunity cost of cash, we refer to Yan (2006).

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argues that a high level of abnormal cash proxies for managerial ability with regard to stock picking, controlling costs during fund outflows and equity transactions, as well as market-timing.[2]

This paper is the first to study the determinants of cash holdings for a large sample of 1464 EU equity funds in the time period from 2004 to 2017. We examine the performance implications of abnormal cash holdings and, hence, provide an out-of-sample test for the US results derived by Simutin (2014).[3] The fund universe of the EU is appropriate for this out-of-sample test since it is one of the most important financial market places globally and domicile of a large number of equity mutual funds (i.e., our sample covers 1464 domestic EU equity funds vs. 2166 domestic US equity funds). Moreover, EU funds frequently differ from US funds in important aspects (e.g., EU funds are – on average – significantly younger and smaller than US funds) making the out-of-sample test even more meaningful.

We obtain the following results: First, the level of cash holdings for EU funds is strongly linked to a fund's fee structure, past flows and flow volatility, and a fund's investment strategy. In particular, funds with a high expense ratio, high past flows and flow volatility, and high sensitivities to the market and the size factor of Fama and French (1993) show high cash ratios. Interestingly, these relationships are robust for our control sample of 2166 US equity mutual funds (in the identical sample period). Hence, the main drivers of cash holdings seem to be similar for both EU and US funds.

Second, we find that EU funds with high abnormal cash holdings earn higher returns than funds with low abnormal cash holdings over the subsequent six-month period. This return spread is robust to risk adjustments of the Carhart (1997) model (i.e., risk-adjustments for the market-, size-, value-, and momentum factor) and amounts to a semi-annual 0.48%. We observe that this return spread is economically similar among the three EU countries with the highest number of funds in our sample (i.e., Luxembourg, France, and Germany). However, we also document that it is not long-lasting: Funds with high abnormal cash do not significantly outperform their low abnormal cash peers over the subsequent 12- to 18-month periods. Hence, our results only partially support the results of Simutin (2014) in our out-of-sample test using EU equity funds.[4]

The remainder of the paper is as follows: Section 2 introduces the data and main variables. In Section 3 we investigate determinants of funds' cash holdings. Section 4 examines the relationship between (abnormal) cash and future performance. We conclude in Section 5.

2. Data and main variables

We obtain semi-annual data for open-end equity funds from the US and the EU with daily liquidity from the Morningstar database in the time period from 2001 to the first half of 2017.[5] Each period t in the empirical analysis corresponds to a six-month time frame. To prevent that our examination is distorted by very small funds, we restrict our sample to funds with TNA larger than USD 20 million. We exclude index funds, ETFs and closed-end funds from the analysis and require that the investment focus of a fund is 'domestic' or 'global'.[6] To avoid the inclusion of non-equity funds, we require all funds to allocate at least 80% of TNA to equity.

To compute funds' sensitivities to different risk factors we apply the US (Carhart, 1997) four-factor model for US funds, and the European (Carhart, 1997) four-factor model for EU funds. Data for the monthly US and European risk factors is retrieved from Kenneth French's webpage. Individual fund betas with regard to the market factor (MKT), the size factor (SMB), the value factor (HML), and the momentum factor (UMD) are then estimated over a rolling horizon of 36 months using monthly return data. Hence, the rolling estimation horizon shortens the sample period by three years. Our final sample consists of 56,572 fund-half-year observations including 3630 unique equity funds in the time period from 2004 to the first half of 2017. The sample splits up into 2166 US funds and 1464 EU funds. We report the exact number of funds for each individual country in Panel A of Table 1. Among the 15 EU countries in our sample, Luxembourg (469), France (410), and Germany (188) are the countries with the highest number of individual funds.

We display summary statistics for the main variables in our study (separately for the US and the EU sample) in Panel B of Table 1. These are a fund's cash holdings (in % of TNA), size (log of TNA), age (in years), the expense ratio (in %), six-months return (in %), six-months flow (scaled by TNA of the past period, in %), flow volatility (computed as the volatility of monthly net flows over the past 36 months), and sensitivites with regard to the market return (MKT), the size factor (SMB), the value factor (HML), and the momentum factor (UMD) of the Carhart (1997) four-factor model. We also report the respective mean differences for each variable in the

[2] Another string of literature focuses on the importance of cash for funds' liquidity management. Edelen (1999) argues that flow shocks trigger liquidity-motivated trading by fund managers, in order to avoid large fluctuations in cash positions. Hanouna et al. (2015) examine the interaction between fund flows, cash holdings, and liquidity of fund portfolios for the US mutual fund industry. Chernenko and Sunderam (2016) study liquidity transformation in mutual funds. They find that mutual funds hold substantial amounts of cash which they use to accommodate inflows and outflows rather than transacting in the underlying portfolio assets.

[3] Such an out-of-sample test is important because the result of a significantly positive link between a fund's abnormal cash and its future performance is surprising at first glance. Hence, it is necessary to obtain evidence beyond the one provided by US data to decide whether the relationship is a pure US phenomenon or whether it also prevails outside of the US.

[4] Note that a detailed examination about the drivers of the abnormal cash return spread for EU funds based on portfolio holding data is out of scope for this research paper. For a thorough analysis about potential drivers of the abnormal cash performance spread in the US market, we refer to Simutin (2014).

[5] The starting date of our analysis is justified by the availability of cash holdings for the majority of funds in our sample starting in 2001. Also note that all EU funds in our sample are UCITS funds.

[6] All our results are robust if we only include funds with the investment focus "domestic" in the empirical analysis.

Table 1
Summary statistics Panel A of this table presents the number of funds and number of observations for our sample differentiated by the funds' domiciles. Panel B of this table presents summary statistics for the main variables in the empirical analysis for all funds, US funds, and EU funds in our sample. The main variables include a fund's cash holdings (in % of TNA), size (log of TNA), age (in years), expense ratio, six-months return (in %), six-months flow (in %), flow volatility (computed as the volatility of monthly net flows over the past 36 months), and its sensitivities with regard to the market return (β_{MKT}), the size factor (β_{SMB}), the value factor (β_{HML}), and the momentum factor (β_{UMD}) of the (Carhart, 1997) four-factor model. To compute funds' sensitivities to different risk factors we apply the US (Carhart, 1997) four-factor model for US funds, and the European (Carhart, 1997) four-factor model for EU funds. Individual fund betas with regard to the market factor (MKT), the size factor (SMB), the value factor (HML), and the momentum factor (UMD) are estimated over a rolling horizon of 36 months. The last column computes the mean differences between the variables for the US and the EU with corresponding significance level. The sample covers 2166 actively-managed US equity funds and 1464 actively-managed EU funds in the sample period from 2004 to 2017. *T*-statistics are in parentheses and are computed using Newey and West (1987) standard errors with 4 monthly lags. ***, **, and * indicate significance at the one, five, and ten percent levels, respectively.

Panel A: Sample

Country	Number of funds	Number of observations
USA	2166	37,378
Austria	84	1,027
Belgium	57	549
Denmark	3	52
Estonia	1	12
Finland	81	1201
France	410	4,720
Germany	188	3236
Greece	2	21
Ireland	61	606
Italy	40	686
Luxembourg	469	6127
Netherlands	35	376
Portugal	8	149
Slovenia	3	13
Spain	22	419
All	3630	56,572

Panel B: Main variables

	US Funds				EU Funds				Mean
Variable	Obs.	Mean	Median	Std Dev	Obs.	Mean	Median	Std Dev	Difference
Cash (in %)	37,378	3.04	2.17	3.21	19,194	3.42	2.11	4.23	− 0. 38***
Size (log of TNA)	37,378	20.03	20.06	1.70	19,194	18.81	18.76	1.39	+ 1. 22***
Age (in years)	37,378	15.96	13.33	12.17	19,194	14.02	12.24	9.14	+ 1. 94***
Expense Ratio (in %)	37,378	1.03	1.03	0.39	19,194	1.77	1.73	0.69	− 0. 74***
Return 6-months (in %)	37,378	4.81	5.46	11.79	19,194	4.74	4.86	14.97	+ 0.07
Flow 6-months (in %)	37,378	2.02	-1.26	13.87	19,194	1.44	-1.15	12.61	+ 0.58
Flow Vola	37,378	10.75	9.21	6.42	19,194	10.07	8.53	5.83	+ 0. 68***
β_{MKT}	37,378	0.99	1.02	0.25	19,194	1.02	1.14	0.49	− 0. 03*
β_{SMB}	37,378	0.29	0.22	0.43	19,194	0.52	0.35	0.79	− 0. 23***
β_{HML}	37,378	-0.01	-0.01	0.30	19,194	0.23	0.08	0.55	− 0. 24***
β_{UMD}	37,378	0.03	0.02	0.22	19,194	0.28	0.07	0.52	− 0. 25***

last column of Panel B. Among others, we observe that average cash holdings of EU funds are 3.42% of TNA and are significantly higher than average cash holdings of US funds with 3.04% of TNA.[7]

To get some idea about the temporal variation of cash over time, we investigate the time series of aggregate cash for US and EU funds. We define aggregate cash as the semi-annual cross-sectional, equal-weighted average of cash over all funds in the sample. Fig. 1 plots the time series of aggregate cash for US and EU funds.

Visual inspection shows that (in line with our summary statistics) aggregate cash is higher for EU funds than for US funds in most of the time periods. Moreover, we observe that both time series are slightly declining over time. The highest point in aggregate cash for US funds occurs in the beginning of our sample period in the first half of 2004, whereas aggregate EU cash peaks in the first half of 2009 (the time period after the bankruptcy of Lehman Brothers and the beginning of a global financial crisis).

[7] This finding is surprising in the view of the different regulatory frameworks in the US (Investment Company Act and SEC regulations) and the EU (UCITS directive). In the US, at least 85 percent of a mutual fund's portfolio must be invested in "liquid assets", i.e., cash and securities that can be disposed of within seven days at a price approximating the market value. In the EU, no more than 10% of assets can be invested into assets that are not listed on an exchange or dealt in another regulated market. However, in the EU, no detailed rules are demanded with regard to the liquidity of a security. Hence, we do not find evidence that the more stringent US rule with regard to liquid assets results in higher overall cash holdings.

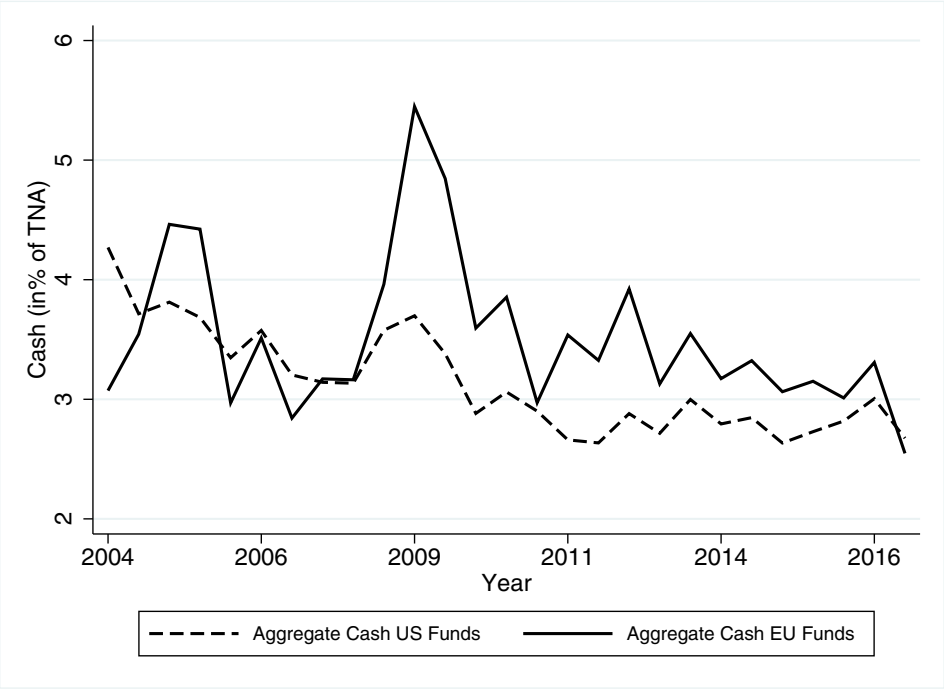

Fig. 1. Aggregate cash holdings of US and EU funds over time. This figure displays the evolution of aggregate cash holdings over time, separately for US funds and EU funds. Aggregate cash is defined as the semi-annual, equal-weighted average of cash holdings as a percentage of TNA over all individual funds i in period t in our sample. The sample covers 2166 actively-managed US equity funds and 1464 actively-managed EU funds in the sample period from 2004 to 2017.

Why is aggregate cash generally higher for EU funds than for US funds? In unreported tests (which are available from the authors upon request), we find that differences in the overall market environment between the EU and the US have a strong impact on differences in aggregate cash holdings between EU funds and US funds. In particular, we document that differences in market returns (market volatility) in period t are significantly negatively (positively) related to differences in aggregate cash holdings between EU funds and US funds in period $t + 1$. Hence, aggregate cash of EU funds is generally higher than aggregate cash of US funds due to a lower market return (7.94% p.a. vs. 8.46% p.a. for the US) and higher market volatility (11.11% vs. 8.67% for the US) in the Eurozone during our sample period.

3. Determinants of cash holdings

In this section we examine the determinants of funds' cash holdings. We regress fund i's cash holdings in period $t + 1$ on a set of different fund characteristics, all measured in period t as described in Section 2. We follow (Simutin, 2014) and run multivariate (Fama and MacBeth, 1973) regressions on the individual fund level:

$$\begin{aligned}\text{Cash}_{i,t+1} = \alpha + \beta_1 \cdot \text{Size}_{i,t} + \beta_2 \cdot \text{Age}_{i,t} + \beta_3 \cdot \text{Expenses}_{i,t} + \beta_4 \cdot \text{Return}_{i,t} + \beta_5 \cdot \text{Flow}_{i,t} + \\ \beta_6 \cdot \text{Flow Vola}_{i,t} + \beta_7 \cdot \beta_{MKT_{i,t}} + \beta_8 \cdot \beta_{SMB_{i,t}} + \beta_9 \cdot \beta_{HML_{i,t}} + \beta_{10} \cdot \beta_{UMD_{i,t}} + \epsilon_{i,t+1}.\end{aligned} \quad (1)$$

T-statistics are computed using Newey and West (1987) standard errors with four lags to control for serial correlation. Table 2 reports the results of the regression analysis.

In specifications (1)–(3) we display the results for the pooled sample, as well as for the US and the EU sample. We find that five out of the ten explanatory variables have a significant positive effect on a fund's cash holdings in all three samples: the expense ratio, past flows and flow volatility, and risk loadings with regard to the market and the SMB factor.[8] These results are intuitive and show that cash holdings are strongly affected by (i) fund expenses which have to be paid in cash, (ii) fund share purchases and redemptions by investors, and (iii) the investment strategy of the fund manager (i.e., funds with higher market and SMB risk loadings hold more cash to hedge themselves against downturns and to remain liquid). We confirm most of these significant relationships when we run the identical regression for the three countries with the highest number of funds in the EU sample (i.e., Luxembourg, France, and Germany) in specifications (4) to (6).

We also observe that five out of the ten explanatory variables show unstable coefficient estimates between the US sample and the

[8] These results are in line with empirical findings for domestic US funds as presented in Yan (2006) and Simutin (2014).

Table 2
Determinants of cash holdings This table presents the results of multivariate (Fama and MacBeth, 1973) regressions of a fund's future cash in period $t + 1$ on a fund's size (log of TNA), age (in years), expense ratio, six-months return (in %), six-months flow (in %), flow volatility (computed as the volatility of monthly net flows over the past 36 months), and its sensitivities with regard to the market return (β_{MKT}), the size factor (β_{SMB}), the value factor (β_{HML}), and the momentum factor (β_{UMD}) of the Carhart (1997) four-factor model. To compute funds' sensitivities to different risk factors we apply the US (Carhart, 1997) four-factor model for US funds, and the European (Carhart, 1997) four-factor model for EU funds. Individual fund betas with regard to the market factor (MKT), the size factor (SMB), the value factor (HML), and the momentum factor (UMD) are estimated over a rolling horizon of 36 months. The last column shows the sign of the predicted effect for each variable (for US funds and EU funds, respectively). The sample covers 2166 actively-managed US equity funds and 1464 actively-managed EU funds in the sample period from 2004 to 2017. *T*-statistics are in parentheses and are computed using Newey and West (1987) standard errors with 4 monthly lags. ***, **, and * indicate significance at the one, five, and ten percent levels, respectively.

	(1) Cash All Funds	(2) Cash US Funds	(3) Cash EU Funds	(4) Cash France	(5) Cash Luxembourg	(6) Cash Germany	Overall Effect US Funds vs. EU Funds
Size	−0.0496	0.0588*	−0.260***	−0.134	0.279	−0.166	+/−
	(−1.60)	(1.83)	(−6.05)	(−1.10)	(0.46)	(−1.61)	
Age	0.00730**	0.0102***	−0.00948	−0.0367	−0.175	−0.0009	+/−
	(2.67)	(4.00)	(−1.53)	(−1.25)	(−1.44)	(−0.11)	
Expense Ratio	1.113***	1.443***	0.837***	0.843***	1.578*	0.902*	+
	(10.13)	(14.98)	(7.01)	(6.50)	(1.72)	(1.90)	
Return 6-months	0.00999	0.0338**	−0.0362	0.0407	−0.0375	−0.155	+/−
	(0.60)	(2.61)	(−0.84)	(1.55)	(−0.20)	(−1.37)	
Flow 6-months	0.0282***	0.0306***	0.0125***	0.0173*	0.0420*	0.0330	+
	(7.21)	(7.76)	(3.55)	(1.73)	(1.86)	(1.61)	
Flow Vola	0.0300**	0.0275***	0.0527***	0.113***	0.0337	0.0456*	+
	(2.55)	(8.72)	(4.68)	(3.35)	(0.55)	(1.84)	
β_{MKT}	2.295**	3.739***	2.249**	1.141**	3.498**	2.550	+
	(2.50)	(2.83)	(2.37)	(2.19)	(2.56)	(1.13)	
β_{SMB}	0.202*	0.363**	0.127**	1.086*	0.0127	0.645	+
	(1.85)	(2.74)	(1.79)	(1.96)	(0.01)	(0.60)	
β_{HML}	0.060	−0.019	0.102	2.348***	−0.298	1.263	−/+
	(1.17)	(−0.51)	(0.23)	(2.97)	(−0.28)	(0.58)	
β_{UMD}	0.00571	−0.439*	0.966	−1.923***	1.762	0.480	−/+
	(0.02)	(−2.01)	(1.47)	(−3.22)	(1.17)	(0.29)	
Constant	5.469***	3.770***	11.36***	4.804**	0.788	13.60***	
	(6.14)	(4.14)	(7.86)	(2.16)	(0.06)	(3.13)	
N	53,476	35,344	18,321	4545	5809	3117	
R^2	0.079	0.119	0.105	0.167	0.195	0.158	

EU sample. Fund size, fund age and 6-month return show a positive impact in the US sample vs. a negative impact in the EU sample, whereas the opposite holds for fund sensitivities to the (Carhart, 1997) HML and UMD factors. We argue that for these variables a theoretical link to cash holdings is not clear, and hence, no unique empirical relationship is identified.[9]

4. Performance implications of cash and excess cash

Cash is typically seen as a drag to fund performance because it prohibits the fund manager from earning the equity risk premium. However, Simutin (2014) shows that US funds with cash holdings in excess of the level predicted by fund attributes (i.e., high abnormal cash funds) exhibit higher future performance than their low abnormal cash peers. His argument is that abnormal cash is attributable to managerial decisions to adjust a fund's cash holdings. Such adjustments and thus the level of abnormal cash can reflect (i) a manager's stock picking ability, (ii) a manager's aptitude at controlling fund costs, particularly during investor redemptions, and (iii) market timing ability. In this section, we test whether Simutin (2014)'s US findings replicate out-of-sample also for our EU fund dataset.

First, we examine the relationship between raw cash holdings in period t and future fund performance in period $t + 1$ (i.e., in the subsequent six-months period) and perform equal-weighted univariate portfolio sorts. For each period t, we sort all funds into quintile portfolios based on cash in increasing order. We then compute the equal-weighted average returns of these portfolios in period $t + 1$ and adjust the returns by applying the risk factors of the (Carhart, 1997) four-factor model. Panel A of Table 3 reports the results of the four-factor alphas for different geographical samples.

We find that in all geographical samples (pooled, US, EU, France, Luxembourg, and Germany) there is no significant relationship

[9] As an example, consider a fund's size. On the one hand, one can argue that size should be negatively related to cash because larger funds tend to have a higher number of shareholders. Assuming that redemption risk is not perfectly correlated across investors, an increase in the number of shareholders reduces the probability of a large aggregate redemption shock and hence, the fund has to hold less cash (Yan, 2006). On the other hand, size could be positively connected to cash since larger funds are less nimble and may find it costlier to raise cash from selling their shareholdings (e.g., due to price pressure). Hence, they choose to hold more cash than smaller funds do (Simutin, 2014).

Table 3
Univariate portfolio sorts: performance implications Panel A of this table reports results from univariate portfolio sorts based on a fund's cash in period *t*. In each period, we rank funds into quintiles (1–5) and form equal-weighted portfolios based on this measure. For each quintile portfolio, we compute the average (Carhart, 1997) four-factor alpha in period $t + 1$. We apply the US (Carhart, 1997) four-factor model for US funds, and the European (Carhart, 1997) four-factor model for EU funds. The row labeled "High – Low" reports the difference between the alphas of portfolio 5 and portfolio 1, with corresponding statistical significance levels. Panel B of this table reports results from univariate portfolio sorts based on a fund's abnormal cash in period *t*. In each period, we rank funds into quintiles (1–5) and form equal-weighted portfolios based on this measure. For each quintile portfolio, we compute the average (Carhart, 1997) four-factor alpha in period $t + 1$. We apply the US (Carhart, 1997) four-factor model for US funds, and the European (Carhart, 1997) four-factor model for EU funds. The row labeled "High – Low" reports the difference between the alphas of portfolio 5 and portfolio 1, with corresponding statistical significance levels. Panel C of this table repeats the univariate portfolio sorts of Panel B for all funds, US funds, and EU funds. However, we evaluate risk-adjusted returns in period $t + 2$ and $t + 3$. The sample covers 2166 actively-managed US equity funds and 1464 actively-managed EU funds in the sample period from 2004 to 2017. *T*-statistics are in parentheses and are computed using Newey and West (1987) standard errors with 4 monthly lags. ***, **, and * indicate significance at the one, five, and ten percent levels, respectively.

Panel A: Cash and Carhart (1997) alphas

Portfolio	All Funds	US Funds	EU Funds	France	Luxembourg	Germany
1 Low Cash	− 0.83%	− 0.64%	− 0.90%	− 1.09%	− 0.37%	− 0.30%
2	− 0.52%	− 0.33%	− 0.81%	− 1.51%	− 0.74%	− 0.69%
3	− 0.61%	− 0.54%	− 0.62%	− 1.11%	− 0.17%	− 0.97%
4	− 0.54%	− 0.44%	− 0.85%	− 1.21%	− 0.34%	− 1.10%
5 High Cash	− 0.68%	− 0.35%	− 0.96%	− 1.07%	− 0.24%	− 0.67%
High – Low	0.15%	0.29%	− 0.06%	− 0.02%	0.13%	− 0.37%
	(1.04)	(1.21)	(−0.22)	(−0.14)	(0.69)	(−0.94)

Panel B: Abnormal Cash and Carhart (1997) alphas

Portfolio	All Funds	US Funds	EU Funds	France	Luxembourg	Germany
1 Low Abnormal Cash	− 1.08%	− 0.73%	− 1.18%	− 1.51%	− 0.24%	− 0.94%
2	− 0.54%	− 0.48%	− 0.82%	− 1.26%	− 0.48%	− 1.06%
3	− 0.42%	− 0.51%	− 0.78%	− 1.19%	− 0.46%	− 0.50%
4	− 0.55%	− 0.35%	− 0.85%	− 1.9%	− 0.30%	− 0.51%
5 High Abnormal Cash	− 0.59%	− 0.20%	− 0.70%	− 0.90%	+ 0.20%	− 0.46%
High – Low	0.49%**	0.53%**	0.48%**	0.61%*	0.44%	0.48%*
	(2.16)	(2.07)	(2.05)	(1.70)	(1.14)	(1.90)

Panel C: Abnormal Cash and Carhart (1997) alphas in periods $t + 2$ and $t + 3$

	period $t + 2$			period $t + 3$		
Portfolio	All Funds	US Funds	EU Funds	All Funds	US Funds	EU Funds
1 Low Abnormal Cash	− 0.92%	− 0.63%	− 1.01%	− 0.85%	− 0.61%	− 0.94%
2	− 0.65%	− 0.40%	− 1.00%	− 0.67%	− 0.43%	− 0.95%
3	− 0.69%	− 0.41%	− 0.95%	− 0.62%	− 0.45%	− 0.85%
4	− 0.55%	− 0.46%	− 0.97%	− 0.51%	− 0.48%	− 0.85%
5 High Abnormal Cash	− 0.65%	− 0.35%	− 0.76%	− 0.66%	− 0.41%	− 0.78%
High – Low	0.27%	0.28%	0.25%	0.19%	0.20%	0.16%
	(1.32)	(1.21)	(1.19)	(1.03)	(0.98)	(1.06)

between cash and future risk-adjusted returns. In line with common intuition, the relationship between cash and future performance is negative in the EU, France, and Germany.

We then investigate the relationship between abnormal cash and future performance. As in Simutin (2014), we define a fund's abnormal cash as the residuals in a regression of cash on different fund characteristics. Specifically, in this paper, we compute abnormal cash for a given fund as the residuals of regression equation (1). As before, we then perform equal-weighted univariate portfolio sorts using abnormal cash in period *t* and compute risk-adjusted future fund performance in period $t + 1$. Results are reported in Panel B of Table 3.

In contrast to the results we obtain when using raw cash, funds with high abnormal cash earn higher future risk-adjusted returns than their low abnormal cash peers in all geographical samples over the subsequent six-months period. The risk-adjusted semi-annualized return spread between high and low abnormal cash funds is 0.49% in the whole sample, 0.53% for US funds, and 0.48% for EU funds with corresponding statistical significance at the 5% level. We also find semi-annualized positive spreads of 0.61%, 0.44%, and 0.48% for France, Luxembourg, and Germany.

Finally, we investigate whether the abnormal cash performance spread is a long-lasting effect for mutual funds. For this purpose, we repeat our univariate portfolio sorts using abnormal cash in period *t*, but now evaluate risk-adjusted returns in periods $t + 2$ (i.e., in the 7–12months period after portfolio formation) and $t + 3$ (i.e., in the 13–18months period after portfolio formation). Results are displayed in Panel C of Table 3. We show that the risk-adjusted return spread between funds with high abnormal cash and their low abnormal cash peers is still positive; however, the spread shrinks considerably and is neither statistically significant for the US fund

sample nor for the EU fund sample. Hence, our results indicate that the abnormal cash performance spread is not long-lasting. Moreover, these results also raise doubt about the interpretation of abnormal cash as a direct proxy of fund manager skill, as argued by Simutin (2014).

5. Conclusion

In this paper we analyze the determinants and performance implications of cash holdings for a large sample of actively-managed open-end equity funds in the European Union. We find that cash holdings are strongly correlated to a fund's fee structure, past flows and flow volatility, and a fund's investment strategy. Further, we document that EU funds with high abnormal cash, i.e., funds with cash holdings in excess of the level predicted by fund characteristics, earn higher future risk-adjusted returns than low abnormal cash EU funds over the subsequent six-months period with a semi-annual spread of 0.48%. However, we also show that the abnormal cash performance spread is not long-lasting and diminishes after 12–18months into the future.

Supplementary material

Supplementary material associated with this article can be found, in the online version, at 10.1016/j.frl.2018.08.006.

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