Holding cash for the better decision? A comparison study of the liquidity management between China and US mutual funds

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Abstract. This paper comparatively studies the different implications of the fund cash holding for fund strategies, flows and performance between China and the US. I use the R-square decomposition technique to examine the determinants of cash holdings. I find that funds in China show more concerns on the non-risk factor than the risk factor in determining the cash level, while US funds show more concerns on risk factors. Funds in the US tend to title their portfolio to lower risk loading and reduce the systematic risk than the funds in China. The abnormal cash holdings can attract money flows in both these two markets. It positively predicts performance in the US and the predictive power is enhanced by the smart money effect. The paper suggests that abnormal cash holding is an essential perspective to be considered in investors' fund decisions.

Keywords: Cash holdings, Risk factors, Mutual fund performance, Fund flows

1   INTRODUCTION

Cash holdings are an essential component of actively managed mutual funds. Holding cash is costly (Wermers, 2000) [42], but it also provides fund managers with flexibility to accommodate fund flows (Simutin, 2013) [39]. As the largest emerging market, China has experienced rapid growth with the industry size increasing from 2.62 billion yuan in 2002 to 274.73 billion yuan in 2016. Interestingly, with relatively higher average cash holdings (12%) in China than the level in the US (close to zero), the mutual fund market in China still performs well, with an average industry return of 8% in the last decade, while the US market provides an average performance close to zero. In addition, in 2015, some equity funds in China changed their names to allocation funds to avoid the 80% equity allocation limits on policies. It indicates that cash holdings that directly reveal the asset allocation proportions of fund managers should be an important signal for investors as this can reflect management skills (Simutin, 2013; Graef et al., 2018) [39] [22].

As Simutin (2013) [39] points out, US equity funds with higher abnormal cash can outperform their peers; a few studies have explored the allocation and application of this abnormal cash. In addition, there is a growing body of literature focusing on

portfolios of funds (Cremers and Petajisto, 2009; Kacperczyk, Sialm, and Zheng, 2005) [13] [28]. I identify several research gaps in the existing literature. First, existing studies offer little discussion on the relative importance of cash determinants and the priorities of fund managers in determining the level of their cash holdings. Second, few studies empirically examine the risk preferences or investment strategies of funds with higher abnormal cash. Finally, little literature interactively studies the impact of abnormal cash and fund flows on fund performance. The performance predictability of abnormal cash holdings might be affected by lagged flow or the smart money effect (Gruber, 1996; Zheng, 1999) [23] [44].

Do skilled managers keep more cash? How do fund managers with high abnormal cash holdings invest? Do cash holdings imply superior management skills outside of US mutual fund markets? On the one hand, holding cash is costly, 0.7% of annual fund underperformance is due to nonstock holdings (Wermers, 2000) [42]. On the other hand, fund managers can benefit from the flexibility that holding cash offers, allowing better decisions, accommodating fund flows and controlling transaction costs (Simutin, 2013) [39]. I follow Simutin (2013) [39] and Greaf et al. (2018) [22] and define abnormal cash holdings (ACH) as residuals by regressing cash holdings on multiple determinants. R-squared decomposition is applied to examine the relative importance of cash determinants. Then, I conduct multiple regression analysis to detect the investment strategies of high abnormal cash funds towards different risk factors. I further examine the cash-flow relationship and construct long-short fund portfolios to explore the relationship between abnormal cash holding and fund performance.

In this study, I shed light on the perspective of portfolio risk exposure to understand why abnormal cash holdings can imply superior performance. This is the first study to focus on the trading practices of fund managers with relatively higher cash holdings and to compare their impact between China and the US. I obtain a comprehensive dataset comprising China mutual fund data and portfolio holdings data from the GTA Chinese mutual fund database. The sample covers 556 actively managed funds in China, from 2004 to 2016. Also, for comparison, I obtain US mutual fund data from Morningstar Direct which covers 2,412 U.S. equity funds from 2000 to 2016.

The main results are as follows: First, non-risk factors such as fund size, fund age and return volatility are essential determinants of cash holdings in China. Specifically, small and young funds with higher return volatility tend to hold more cash. Fund size, fund age, and return volatility explain 14.39%, 14.62% and 19.66% of cash holdings in the next quarter. Also, I find that funds with lower fund-report attention and lower active shares carry more money. Fund-report attention and active shares, respectively, explain 15.56% and 4.18% of cash holdings in China. In contrast, risk factors including market risk, size risk, value risk and momentum risk show relatively higher explanatory power than non-risk factors in the US. Funds in smaller families with higher lagged flows and lower market betas tend to hold more cash. Market beta accounts for the most substantial decomposed R-squared at 43.08%, while fund family size and lagged flows also account for 14.21% and 11.29% of the next quarter's cash holdings in the US.

Second, fund managers with higher abnormal cash holdings tend to tilt their portfolios to stocks with higher asset growth and higher profitability in China. While in the US, managers reduce their portfolios' risk loading on market risk, momentum risk,

profitability risk, management risk and performance risk. It implies that funds in the US with higher abnormal cash are more conservative and seek to reduce their portfolio risk exposure compared to funds in China.

Third, higher abnormal cash holdings can attract money inflows in both the Chinese and US markets. 1% of abnormal cash holding is related to 0.162% (t=2.435) of fund inflows in China. In addition, in the US, 1% of abnormal cash holding is related to 0.183% (t=2.959) of fund inflows in the next quarter. Sophisticated investors might identify it as a trading signal in their fund selections.

Fourth, abnormal cash holdings can positively predict fund performance in the US markets. A long-short fund portfolio sorting by abnormal cash holdings generates a monthly three-factor alpha of 0.065% (t=2.02) and a monthly four-factor alpha of 0.06% (t=1.85). Moreover, the lagged flow might have a positive impact on abnormal cash holdings in terms of predicting fund performance in the US below the medium flow quintile. US funds with extreme lagged flows but higher abnormal cash tend to underperform compared to their peers, indicating that there is a tradeoff between more money inflows and the cost of holding cash.

My study contributes to three strands of the literature. First, there is a growing number of researchers studying the determinants of mutual fund cash holdings and liquidity management (Edelen, 1999; Yan, 2006; Brunnermeier and Pedersen, 2009; Simutin, 2013; Hanouna et al., 2015; Graef et al., 2018) [16] [43] [6] [39] [24] [22]. Moreover, there is extensive literature studying corporate cash holdings (Opler et al., 1999; Dittmar et al., 2003; Dittmar and Smith, 2007; Fresard, 2010) [34] [14] [15] [20]. My result reveals the relative importance of cash determinants and compares these between China and the US fund markets. It suggests that funds in developed markets are more risk-averse and show more concerns about risk factors such as systematic risk, size risk and value risk. Especially, systematic risk is essential in determining cash holdings. While funds in developing markets utilize more straightforward fund characteristics to determine cash.

Second, my study is related to the literature on the risk-taking of mutual fund asset allocations including Frazzini and Petersen (2014) [19], Christoffersen and Simutin (2017) [11] and Boguth and Simutin (2018) [5]. It is also related to the literature studying risk factors in investors' decisions, such as Barber, Huang, and Odean (2016) [2], Berk and Van Binsbergen (2016) [3] and Agarwal, Green, and Ren (2018) [1]. The findings provide empirical support to explicitly understand the sources of abnormal cash holdings and how managers tilt their portfolios. My results suggest that fund managers with higher abnormal cash have different risk incentives in stock selections. Profitability risk and investment risk from the Q-factor model by Hou, Xue, and Zhang (2015) [25] appear to be signals to fund managers in China, while systematic risk, momentum risk and mispricing risk appear to be the concerns of US fund managers in future asset allocation.

Finally, I contribute to the extensive literature studying mutual fund performance and smart money effects including Gruber (1996) [23], Zheng (1999) [44], Frazzini and Lamont (2008) [18] and Keswani and Stolin (2008) [31]. In my studies, the ability of abnormal cash holding is interactively investigated with lagged flow. Abnormal cash holdings show the different predictive power of fund performance between China and the US. My findings also suggest that lagged flows have a positive impact on abnormal

cash holdings under the medium flow level in terms of predicting future fund performance in the US market.

2   Literature Review of Cash Management AND Hypotheses Development

Fund managers in China generally show higher cash levels (12%) than those of US fund managers (close to zero). Notably, the active fund market generally provides an average total return of over 8%, while the US fund market offers a return close to zero (Gruber, 1996) [23]. Also, the literature documents that holding too much cash can increase the opportunity costs of investors or drag down fund returns (Wermers, 2000) [42], while it also provides fund managers with flexibility to cover redemptions or other costs (Chordia, 1996; Simutin, 2013) [10] [39]. Based on the statistics and research above, I study cash holding determinants in China and the US. R-squared decomposition enables us to compare the explanatory power of risk determinants and non-risk determinants. Given that institutional backgrounds differ, I expect risk factors and non-risk factors to have different explanatory power for future cash holdings. Thus, I propose Hypothesis 1:

Hypothesis 1 (Determinant Hypothesis): Fund managers rely more on non-risk factors to determine their cash holdings than risk factors in China, while it reverses in the US.

The literature documents that funds with abnormal cash tend to have better fund performance than their peers (Simutin, 2013; Graef et al., 2018) [39] [22]. It is natural for investors to ask how fund managers utilize abnormal cash to outperform others. On the one hand, fund managers can cover costs related to fund redemption or other transaction costs. On the other hand, if fund managers identify some new investment opportunities, they can quickly purchase new attractive investment opportunities using cash. Yan (2006) [43] finds that there is a trade-off between the cost of holding cash and the flexibility of holding cash to satisfy redemptions or quickly invest in new attractive stocks. They find that funds with higher money inflows tend to hold more cash since they trade infrequently. In contrast, they find that funds with lower cash holdings do not exhibit superior skill in stock selections. Simutin (2013) [39] finds that cash holdings can reflect stock picking ability and market timing ability. It indicates the ability of fund managers to accommodate fund flows or cover relevant costs in transactions. As fund managers benefit from cash to quickly invest in attractive opportunities, I would expect the future trade of fund managers with abnormal cash to be relatively smart.

Moreover, to detect if the investment strategies of funds with high abnormal cash are smart and informative of fund performance, I focus on the perspective of risk exposures. There is a small but growing strand of literature focusing on portfolio management in the risk (beta) strategies of mutual funds. Boguth and Simutin (2018) [5] find that the average market beta of portfolios can capture the desire for leverage and the tightness of their leverage constraints. Fund managers choose to level up their portfolio beta rather than directly use their leverage due to investment constraints. Consistent with the betting-against-beta literature, funds with low-risk exposure outperform high-

exposure funds by 5% per year. With a focus on pension investment, Christoffersen and Simutin (2017) [11] find that fund managers with large defined contribution (DC) assets have an incentive to tilt their portfolios towards high-beta stocks since DC plan sponsors monitor their performance relative to benchmarks which can exacerbate pricing anomalies. DC plan sponsors do not penalize fund managers for selecting high-beta stocks with low or negative alphas as DC fund flows are determined by relative returns rather than alphas or betas.

Motivated by the literature above, I further examine future investment strategies based on the different risk exposures of skilled funds holding abnormal cash. It allows us to understand how abnormal cash affects the future investment of fund managers and why fund managers with higher abnormal cash outperform their peers. Then, I explore how beta-strategies differ in China and the US. I expect skilled managers with higher abnormal cash to reduce their portfolio risk loading from high beta stocks. Thus, I make Hypothesis 2:

Hypothesis 2 (Beta Hypothesis): Skilled fund managers with higher abnormal cash holdings will reduce their portfolio risk exposure (beta) in their future investment strategies.

Investor appears to be sensitive to the cash management of mutual funds and select funds based on their abnormal cash. Simutin (2013) [39] finds that equity funds with higher abnormal cash tend to have better performance. US funds with higher abnormal cash can outperform their peers by 2% annually. Managers benefit from the flexibility to invest in stocks with better ideas, satisfy money outflows, and control trading costs from holding cash. Graef et al. (2018) [22] find that EU funds with higher abnormal cash holdings can outperform lower abnormal cash funds by 0.96% annually. They suggest that abnormal cash should be an important proxy for measuring managers' skills. It also finds that the cash management of mutual funds with illiquid assets can benefit investors with a flexible NAV. Moreover, from the perspective of cash holdings and liquidity management, Goldstein, Jiang, and Ng (2017) [21] find that the flow sensitivity of outflows to the poor performance of corporate bond funds is stronger when corporate funds have fewer cash holdings or more illiquid assets. Chernenko and Sunderam (2016) [9] find that funds tend to hold substantial cash to accommodate fund subscriptions and redemptions rather than transact their portfolios. The tendency is stronger when they have more illiquid assets and market liquidity is low. They also show that external price impacts cannot be mitigated by the cash holdings they have.

As evidence has been found that abnormal cash holdings are predictive of future fund performance in the US market, I expect skilled fund managers in China to take advantage of the flexibility of abnormal cash holdings, too.

Furthermore, Keswani and Solin (2008) [31] find that the smart money effect exists in the UK, as well as in the US. It is attributed to the buying behaviour of both institutional and individual investors. Zheng (1999) [44] finds that funds with higher past flow subsequently outperform their peers with low flow. The smart money effect is large and short-lived. Momentum strategies can only partially explain it. Importantly, the smart money effect is more pronounced in small funds.

The literature indicates that smart money might have an important link to liquidity management in small funds. Based on the literature above, I further examine how

abnormal cash interacts with the smart money effect in predicting fund performance. I expect that sophisticated investors evaluate funds from the perspective of both abnormal cash holdings and the smart money effect in both China and the US. I thus propose Hypothesis 3:

Hypothesis 3 (Flow/Performance Hypothesis): Sophisticated investors identify abnormal cash holdings as a signal with lagged flow to predict fund performance.

3   Data and methodology

I obtain quarterly data for equity funds and allocation funds in China from the GTA Chinese mutual fund database from 2004 to 2016. To ensure a fund is actively investing in the equities market, I take fund classifications from the Morningstar Direct database under the "Morningstar Category" of "Equity funds, Aggressive Allocation funds and Moderate Allocations funds." I exclude index funds, ETFs and closed-end funds in the sample. For US data, I obtain these from the Morningstar Direct database; I restrict the sample to "U.S. equity funds" defined in the Morningstar category and study equity funds with their assets under management (AUM) of at least 20 million dollars (Graef et al., 2018) [22]. I take abnormal cash holdings as residuals by regressing cash holdings on multiple determinants, following Simutin (2013) [39].

To adjust risk factors for fund returns, I apply the CAPM, the Fama-French three-factor model, the Fama-French-Carhart model, the Fama-French five-factor model and the Q-factor model; I compute risk betas from these models over a rolling horizon of 24 months with monthly return data. Due to data availability, I only compute the mispricing factor model from Stambaugh and Yuan (2016) [40] in the US market.

To control for alternative indicators of management skills, I calculate fund diversification (Pollet and Wilson, 2008) [37], industry concentration ratio (Kacperczyk, Sialm, and Zheng, 2005) [28], reliance on public information (Kacperczyk and Seru, 2007) [27], active share (Cremers and Petajisto, 2009) [13] and return gap (Kacperczyk, Sialm, and Zheng, 2006) [29] for each fund in quarter t. For China, the final sample contains 565 actively managed funds; the sample period covers all horizons under data availability from the start of the GTA Chinese mutual fund database. For the US sample, it includes 2,412 actively-managed funds from 2004 to 2016.
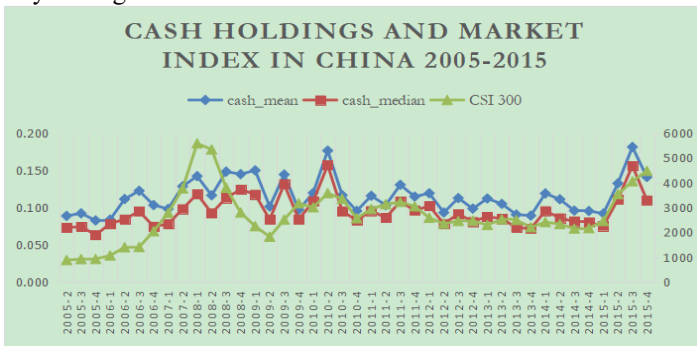

Fig. 1. Aggregate Cash Holdings in China and the CSI300 Index

The figure shows the mean and median of aggregate cash holdings calculated as average cash holdings across all actively managed funds in China and the CSI300 index from 2005Q2 to 2015Q4.
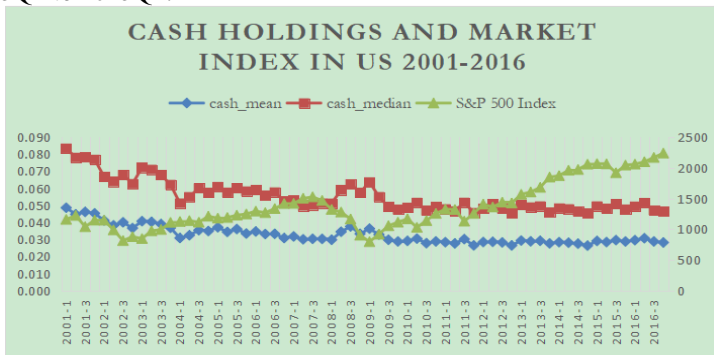

Fig. 2. Aggregate Cash Holdings in the US and the SPX500 Index

The figure shows the mean and median of aggregate cash holdings calculated as average cash holdings across all actively managed funds in the US and the SPX500 index from 2001Q1 to 2016Q4.

I present summary statistics for fundamental fund characteristics, risk betas, risk-adjusted alphas and active measures of my sample. From Figure 1, in China, average cash holdings are 12% across all funds in the sample. Aggregate cash holdings rose from 9.81% in 2007Q1 to 14.42% in 2009Q3. Similarly, they rise from 9.18% in 2015Q1 to 18.12% in 2015Q3. From Figure 2, in the US, average cash holdings are less than 2%, while cash holdings increased from 2.98% in 2008Q1 to 3.63% 2009Q1 and they remain at a low level of about 2.94% after 2013Q1. This indicates that fund managers tend to hold more cash when the market is volatile, especially during a financial crisis.

4   Empirical results

4.1   What Determines Fund Cash Holdings?

To explore the determinants of fund cash holdings, I regress cash holdings on equity holdings, risk betas from the Fama-French-Carhart model and fundamental fund characteristics. I also control for active measures using portfolio-holding data in China. I run double-clustered regressions using Equation (1) to get coefficients and control for both fund and time effects following Petersen (2009) [36] and Thompson (2011) [41]. Decomposed R-squared (individual R2) calculated with the Shapley-Owen decomposition method are listed for each regression (Hüttner and Sunder, 2011) [26]

$$Cash\ holdings_{i,t} = \alpha_0 + \beta_i^{alpha} * equity\ holdings_{i,t-1} + \sum \beta_i^{risk} *$$
$$risk\ factor_{i,t} + \sum \beta_i^{active} * active\ factor_{i,t} + * \sum \beta_i^{funda} * fundamentals_{i,t-1} +$$
$$\varepsilon_{i,t} \tag{1}$$

Table 1. Determinants of Cash Holdings

	China				US			
	(1)		(2)		(3)		(4)	
Variables	Coeff.	Ind. R^2	Coeff.	Ind. R^2	Coeff.	Ind. R2	Coeff.	Ind. R2
Equity Holdings	-0.066***	8.68	-0.061***	8.03	0.003***	3.08	0.002**	1.42
	(-3.128)		(-3.068)		（2.642）		（2.135）	
Fund size (log)	-0.007***	14.36	-0.006***	14.39			0.003***	4.43
	(-2.882)		(-2.766)				（5.841）	
Family size log	-0.001	3.68	-0.001	3.79			-0.002***	14.21
	(-0.166)		(-0.274)				(-6.413)	
Age (quarter) log	-0.015***	14.42	-0.016***	14.62			-0.002**	1.68
	(-3.529)		(-3.724)				(-2.486)	
Total expense ratio	0.17	3.67	0.167	3.42			0.746***	9.43
	（1.276）		（1.255）				（5.262）	
Lagged Flow	-0.011**	0.89	-0.009	0.77			0.022***	11.29
	(-2.084)		(-1.547)				（11.341）	
Return volatility	0.465***	22.16	0.442***	19.66			0.073***	1
	（4.939）		（4.038）				（3.239）	
Flow volatility	0.012	5.35	0.012	5.1			-0.001	0.18
	（0.828）		（0.792）				(-1.352)	
Fundamental Subtotal R^2		**73.21**		**69.77**		**3.08**		**43.63**
Diversification	0.000	1.89	-0.001	2.22				
	(-0.111)		(-0.339)					
Industry concentration ratio	-0.1	1	-0.098	1.05				
	(-1.433)		(-1.428)					
Reliance on Public infor-mation	0.005	3.08	0.004	2.81				
	（0.749）		（0.692）					
Table 1 (continued)								
Fund-report attention	-0.017**	16.33	-0.017**	15.56				
	(-2.161)		(-2.029)					
Active Share	-0.053**	4.18	-0.060**	4.18				
	(-2.042)		(-2.342)					
Return gap	0.002	0.31	-0.001	0.42				
	（0.147）		(-0.046)					
Active Subtotal R^2		**26.79**		**26.24**				
Fund return			-0.023	0.78	-0.009	0.6	-0.011*	0.45
			(-0.450)		(-1.256)		(-1.801)	
Beta MKT FF4			0.006	0.6	-0.044***	70.36	-0.047***	43.08
			（0.387）		(-8.970)		(-10.039)	
Beta SMB FF4			-0.007	0.25	0.008***	15.32	0.006***	7.37
			(-0.656)		（5.858）		（4.208）	
Beta HML FF4			0.002	0.2	0.005**	9.3	0.004**	4.6
			（0.219）		（2.255）		（2.002）	
Beta UMD FF4			-0.010*	2.16	-0.002	1.34	-0.002	0.86
			(-1.699)		(-0.705)		(-0.470)	
Risk Subtotal R^2				**3.2**		**96.31**		**55.92**
Constant	0.385***		0.391***		0.072***		0.065***	
	（5.067）		（5.025）		（14.403）		（6.263）	
Observations	4,885		4,698		65,303		62,157	
cluster quarter effects	Yes		Yes		Yes		Yes	
cluster fund effects	Yes		Yes		Yes		Yes	
Adjusted R-squared	0.121		0.124		0.0498		0.0847	

Table 1 shows the results of four regression specifications and decomposed R-squared is also calculated for each independent variable.

For the China funds, in column 2, I include all the variables from fundamental fund characteristics, performance, risk loadings and active measures in the regression.

Within the fundamental characteristics, first, a higher equity holding indicates a lower cash level. The coefficient of equity holding is -0.061 (t=-3.068, R2=8.063%), which is significant at the 1% level. Second, consistent with Chen et al. (2004) [8], small

funds hold more cash, which is in line with the idea that funds can maintain better liquidity with more capital. It shows a significant coefficient of -0.006 (t=2.766, R2= 14.39%) at the 1% level. Third, young funds tend to hold more cash. The log of fund age is negatively related to cash holding (-0.016, t=-3.724, R2=14.62%). It is significant at the 1% level. Fourth, return volatility has a positive effect on cash. Return volatility has a coefficient of 0.442 (t=4.038, R2=19.66%), which is significant at the 1% level. Larger volatility of returns might induce potential redemptions, so fund managers hold more cash to cover it.

Within the risk beta group, it shows little evidence that fund managers determine their holdings based on common risk factors. The R-squared of the risk beta group is 3.20%. It shows that fund managers rely more on fundamental fund characteristics (69.77%) and active investment factors (26.24%) to determine their cash levels.

Within the active investment group, fund-report attention is significantly and nega-tively associated with cash holding (-0.17, t=2.029, R2= 15.56%) at the 5% level. On the one hand, greater public attention to fund holdings can reduce the search costs of fund investors (Sirri and Tufano, 1998). This indirectly provides fund managers with more capital to maintain liquidity which motivates them to hold cash at a low level. On the other hand, it might imply that mutual fund managers hold more cash to accommo-date fund outflows when their portfolios are covered less by analysts. In addition, active share also shows a significant negative coefficient (-0.06, t=-2.342) at the 5% level, with a relatively lower R-squared of 4.18%. It shows that more active strategies may lead to lower cash holdings in funds. As active shares predict better performance (Cremers and Petajisto, 2009) [13], a large deviation of a stock holding from its bench-mark will require more capital to invest, which reduces cash.

Overall, consistent with Hypothesis One, the results imply that, first, fund managers in China show relatively fewer concerns over risk beta in maintaining their cash hold-ings. The risk beta group shows the lowest decomposed R-squared (3.2%) with little significance in determining fund cash holdings. While the fundamental characteristics group accounts for 69.77% and the active investment group for 26.24% of cash hold-ings. Second, for fundamental fund characteristics, return volatility is positively related to cash holdings, while fund equity holding, fund size and fund age have a negative effect on it. Third, for active investment factors, active share and fund-report attention are negatively associated with cash holdings.

For the US fund, in column 4, I include all the variables in the regression. Within the fundamental fund characteristics group, first, equity holdings positively predict cash holdings, with a coefficient of 0.002 (t=2.135, R2=1.42%) which is significant at the 5% level. It suggests that US fund managers with higher equity holdings tend to hold more cash. This might be attributed to the concerns of fund managers over covering alternative costs in transactions. Second, fund size has a positive coefficient of 0.003 (t=5.841, R2=4.43%), which is significant at the 1% level. As large funds suffer from the scale decreasing returns (Chen et al., 2004) [8], fund managers might keep more cash and patiently target better investment ideas. Third, fund family size shows a negative coefficient of -0.002 (t=6.413, R2=14.21%) for fund cash holdings. The coefficient of fund family size is significant at the 1% level. It might indicate that large fund families are more aggressive and hold less cash in their funds, which is consistent with Bhojraj,

Cho, and Yehuda (2012) [4], as large fund families tend to outperform their lower fund-family-size peers. Also, funds in larger families may tend to retain less cash to create different strategies, so as to generate star funds (Nanda, Wang, and Zheng, 2004) [33]. Fourth, lagged fund flow has a positive coefficient of 0.022 (t=11.341) which is significant at the 1% level, with R-squared at 11.29%. On the one hand, it suggests that skilled fund managers hold more cash to reduce the price impact on their portfolios (Chordia, 1996; Lou, 2012) [10] [32]. On the other hand, it implies that fund managers might trade infrequently when they have money inflows. They are more patient, waiting for alternative investment opportunities or the right market timing (Yan, 2006) [43]. Fifth, fund age has a negative coefficient of -0.002 (t=-2.486, R2= 1.68%) for cash holding. The coefficient of fund age is significant at the 5% level. It indicates that young funds tend to hold more cash. Young funds face more competition as active skills develop over time (Pastor, Stambaugh, and Taylor, 2015) [35], which might motivate young funds to hold more cash. Sixth, the total expense ratio is positively associated with cash holdings with a decomposed R-squared of 9.43%. It has the largest coefficient of 0.746 (t=5.262) among cash determinants in Column 4. The coefficient of total expense is significant at the 1% level. This is consistent with Yan (2006) [41] as skilled fund managers with higher fees tend to trade more patiently and to keep more cash, so higher fees might indicate superior skills (Sheng, Simutin, and Zhang, 2017) [38]. Finally, return volatility also positively predicts cash holding with a coefficient of 0.073 (t=3.239, R2=1%) which is significant at the 1% level. It shows that fund managers hold more cash to cover redemptions or other costs when they are volatile in performance (Chordia, 1996; Chernenko and Sunderam 2016) [10] [9].

Within the risk beta group, market beta (MKT) shows a negative and significant coefficient of -0.047 (t=-10.039) at the 1% level on cash holdings which accounts for the largest R-squared of 43.08% in the risk beta group. It indicates that US fund managers might be largely concerned with the systematic risk taken in their portfolios to decide their cash levels, and they might utilize higher beta stock as implicit leverage in their investments (Boguth and Simutin, 2018) [5]. Next, the coefficient of size risk beta (SMB) is 0.006 (t=4.208) which is significant at the 1% level. The coefficient of value risk beta (HML) is 0.004 (t=2.002) which is significant at the 5% level. This suggests that fund managers restrict their cash holdings and hold more cash to cover the risk from common risk factors (Karceski, 2002; Christoffersen and Simutin, 2017) [30] [11]. Size risk beta shows an explanatory power of 7.37% and for value risk beta it is 4.60%, which is relatively lower than the explanatory power of market risk beta. Also, market risk beta has a larger coefficient (-0.047, t=-10.039) than those of size risk beta (0.006, t=4.208) and value risk beta (0.004, t=2.002). It implies that market risk is the main concern of US fund managers.

In sum, the results show that, first, consistent with Hypothesis One, the US funds show more concerns over the risk factors in their cash allocations. The risk beta group accounts for the largest R-squared of cash holdings at 55.92%, while fundamental characteristics have an R-squared of 43.63%. Among the risk beta group, market risk beta outperforms size risk and value risk betas in explanatory power for cash. This is consistent with the beta anomaly that investing in lower market beta stocks could offer more significant returns than higher beta stocks (Frazzini and Pedersen, 2014) [19]. In

addition, it supports that market beta can measure the tightness of leverage constraints (Boguth and Simutin, 2018) [5]. Funds might keep more cash to keep their portfolios at lower market risk levels. Second, equity holding, fund size, lagged flow, total expense ratio and return volatility positively predict cash holdings, while fund family size and fund age show a negative effect on it.

4.2   How do Abnormal Cash Holdings Relate to Investment Strategies?

To understand the investment strategies of fund managers skilled in cash management, I explore the role of abnormal cash holdings in their future risk incentive, which is proxy by risk beta. I apply the Fama-Macbeth (1973) [17] regressions using Equation (2) to obtain residuals as abnormal cash holdings based on Equation (1) following Simutin (2013) [39].

$$Fund\ Beta_{i,t} = \alpha_0 + \beta_1 * abnormal\ cash_{i,t-1} + \beta_2 * fund\ size_{i,t-1} + \beta_3 * family\ size_{i,t-1} + \beta_4 * age_{i,t-1} + \beta_5 * expense_{i,t-1} + \beta_6 * flows_{i,t-1} + \beta_7 * return\ volatility_{i,t-1} + \beta_8 * flow\ volatility_{i,t-1} + \beta_9 * fund\ returns_{i,t-1} + \varepsilon_{i,t}$$

(2)

Table 2. ACH and the Investment Strategies

Panel A: China Funds

Variables	(1) MKT Beta	(2) SMB Beta	(3) HML Beta	(4) UMD Beta	(5) RMW Beta	(6) CMA Beta	(7) I/A Beta	(8) ROE Beta
ACH	0.007	-0.007	-0.023	0.023	0.015	0.026	0.052*	0.044**
	(0.989)	(-0.129)	(-0.731)	(1.283)	(0.582)	(1.092)	(1.805)	(2.182)
Constant	0.640***	0.707***	0.944***	0.852***	0.239	-1.549***	-0.813***	0.557**
	(4.79)	(3.552)	(3.464)	(3.977)	(0.538)	(-3.310)	(-2.692)	(2.305)

Table 2 (continued)

Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	10,449	10,449	10,449	10,449	10,449	10,449	10,449	10,449
R-squared	0.275	0.038	0.067	0.033	0.019	0.063	0.035	0.019
cluster quarter effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
cluster company effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.275	0.0367	0.0663	0.0321	0.0185	0.0622	0.0338	0.0181

Panel B: US Funds

VARIABLES	(1) MKT Beta	(2) SMB Beta	(3) HML Beta	(4) UMD Beta	(5) RMW Beta	(6) CMA Beta	(7) I/A Beta	(8) ROE Beta	(9) MGMT Beta	(10) PERF Beta
ACH	-0.175**	0.192*	-0.1	-0.156***	-0.09	-0.106	0.045	-0.133*	-0.207**	-0.120**
	(-2.426)	(1.71)	(-1.047)	(-3.374)	(-1.295)	(-0.959)	(0.476)	(-1.781)	(-2.454)	(-2.297)
Constant	0.578***	-0.278***	0.411***	0.037	0.393***	0.219***	0.390***	0.266***	0.451***	0.039
	(10.995)	(-2.825)	(5.13)	(1.102)	(8.231)	(2.816)	(4.742)	(4.825)	(6.885)	(1.052)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	95,251	95,495	95,672	95,676	95,697	95,705	95,638	95,587	95,599	95,536
R-squared	0.121	0.127	0.028	0.018	0.015	0.014	0.027	0.006	0.039	0.009
cluster quarter effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
cluster company effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R-squared	0.121	0.127	0.0279	0.0183	0.0147	0.0141	0.0264	0.00636	0.0389	0.00847

In Table 2, I test Hypothesis Two by regressing risk betas calculated from different risk models on abnormal cash holdings and other controls. In my regression

specifications, control variables include fund size, fund family size, fund age, total expense ratio, lagged flows, return volatility, and fund return. The dependent variables are risk betas measured as the risk loadings of fund returns. The main independent variables are abnormal cash holding measured as the rate of additional cash held by fund managers.

In China, the results show that fund managers tend to tilt their portfolios towards stocks with higher investment (I/A) and profitability (ROE) risk exposure. In Panel A, the coefficient of the I/A risk factor on abnormal cash is 0.052 (t=1.805) and the coefficient of the ROE risk factor on abnormal cash is 0.044 (t=2.182). For example, it suggests that 1% of abnormal cash leads to an average increase of 0.044% of risk loadings on the ROE risk factor. The coefficient of I/A risk is significant at the 10% level and the coefficient of the ROE risk factor is significant at the 5% level. The results indicate that higher asset growth and higher profitability companies might be primary targets of funds with high abnormal cash holdings. It might also indicate that fund managers increase their exposure to high-beta stocks to obtain higher relative returns than their benchmarks. (Christoffersen and Simutin, 2017) [11].

In the US, the results show that fund managers tend to tilt their portfolios to stocks with lower systematic risk (MKT), lower momentum risk (UMD), lower profitability (ROE) risk, lower management (MGMT) risk and lower performance (PERF) risk. In Panel B Column 1, for the market risk factor (MKT), the coefficient of abnormal cash holdings is -0.175 (t=-2.46) which is significant at the 5% level. For example, it suggests that 1% of abnormal cash leads to an average decrease of 0.175% of risk loadings on the systematic risk factor. In Columns 4, 8, 9 and 10, for momentum (MGMT), profitability (ROE), management (MGMT) and performance (PERF) risk factors, the coefficients of abnormal cash holdings are -0.156 (t=3.374), 0.133 (t= 1.781), -0.207 (t=2.454) and (-0.120, t=2.297). The coefficients of the market risk factor, the MGMT risk factor and the PERF risk factor are significant at the 5% level. The coefficient of the momentum risk factor is significant at the 1% level, and the coefficient of the ROE risk factor is significant at the 10% level. The results indicate that fund managers tend to reduce their overall risk if they have more cash by decreasing their portfolios comprising companies with higher systematic risk (MKT), higher momentum risk (MOM), higher profitability risk (ROE), high management risk (MGMT) and higher company performance risk (PERF).

In sum, fund managers in China show more aggressive strategies and trade in asset growth risk and profitability risk, while US fund managers tend to reduce their risk exposure, especially market risk. The results demonstrate the different risk incentives of fund managers between China and the US. This is also consistent with Frazzini and Pedersen (2014) [19] as higher beta stocks tend to have lower alphas and Sharpe ratios than low beta ones. High-beta strategies could increase the risk for portfolios which decreases investor incentives to purchase or hold fund shares. However, high-beta strategies may lead to higher returns to compensate for investors' risk-taking. Fund managers should find a tradeoff based on a risk-beta strategy in their asset selection.

4.3 Fund Flows and Abnormal Cash Holdings

How do investors react to funds with higher abnormal cash holdings? To examine the effect of abnormal cash holdings on investors' fund decisions, I regress fund flows on abnormal cash holdings and a group of control variables including fundamental fund characteristics, active investment factors, risk alphas, and risk betas using Equation (3).

$$Flow_{i,t} = \beta_0 + \beta^{cash} * abnormal\ cash_{i,t-1} + \beta_i^{alpha} * alpha_{i,t-1} + \sum \beta_i^{risk} * risk\ factor_{i,t-1} + \sum \beta_i^{active} * active\ factor_{i,t-1} + * \sum \beta_i^{funda} * fundamental_{i,t-1} + \varepsilon_{i,t}$$

(3)

Table 3. ACH and Fund Flows

Variables	China	US
ACH	0.162**	0.183***
	(2.435)	(2.959)
Constant	0.089	0.184***
	(0.89)	(7.748)
Control variables	Yes	Yes
Observations	4,647	93,724
R-squared	0.07	0.043
cluster quarter effects	Yes	Yes
cluster company effects	Yes	Yes
Adjusted R-squared	0.0652	0.043

In Table 3, the results show that higher abnormal cash holdings can significantly attract money inflows in both the Chinese and US markets. The dependent variables for both markets are quarterly fund flows. It is measured as the rate of asset growth (fund size) in one quarter, which is net of returns on assets. The main independent variable is abnormal cash which is the rate of additional cash in fund portfolios. In Panel A, the coefficient of abnormal cash holdings is positive and significant (0.165, t=2.317). It suggests that 1% of abnormal cash leads to an average increase of 0.162% (t=2.435) in fund flows. For Panel B, the coefficient of US abnormal cash holdings is significant and positive (0.183, t=2.959). It implies that 1% of abnormal cash is associated with an average increase of 0.183% of fund flows. The full table can be found in the online appendix of this paper.

In sum, the result suggests that investors treat abnormal cash holding as an important signal in their fund decisions in both China and the US. The findings are consistent with Chordia (1996) [10] and Chernenko and Sunderam (2016) [9] as fund managers conduct liquidity transformation in cash management to reduce the price impact of their portfolios. It also provides evidence that flow-performance sensitivity is stronger in funds with illiquid assets (Chen, Goldstein, and Jiang, 2010) [7]. Moreover, CAPM alpha also plays an essential role in driving flows in both markets, since it shows the largest coefficients in both China and the US. Furthermore, investors in both China and the US are aware of scale-decreasing returns (Chen et al., 2004; Pollet and Wilson, 2008) [8] [37] and the smart money effect (Gruber, 1996; Zheng, 1999) [23] [44].

4.4   Fund Performance and Abnormal Cash Holdings

To examine whether abnormal cash holdings can predict better fund performance, I construct fund portfolios and sort them by abnormal cash holdings (ACH). Then, I sort them by abnormal cash holdings (ACH) and the lagged fund flows. Risk-adjusted alphas are calculated for each portfolio after formation.

Table 4. ACH and Fund Performance

Panel A: single sorting by ACH

Portfolio	China			US		
	CAPM	FF3	FF4	CAPM	FF3	FF4
1 Low Abnormal Cash	0.244%	0.197%	0.351%	-0.061%	-0.089%	-0.098%
2	0.309%	0.237%	0.386%	-0.074%	-0.086%	-0.096%
3	0.293%	0.169%	0.303%	-0.053%	-0.059%	-0.069%
4	0.202%	0.108%	0.254%	-0.057%	-0.073%	-0.081%
5 High Abnormal Cash	0.241%	0.153%	0.293%	-0.015%	-0.040%	-0.051%
High - Low	-0.003%	-0.044%	-0.058%	0.059%	0.065%	0.060%
	(-0.05)	(-0.75)	(-1.09)	(1.86)*	(2.02)**	(1.85)*

Panel B: double sorting by ACH and fund flow

China Funds

Portfolio	1 Low fund flows	2	3	4	5 High fund flows	High -Low	
Table 4 (continued)							
1 Low Abnormal Cash	0.37%	0.18%	0.34%	0.49%	0.54%	0.17%	(0.92)
2	0.38%	0.36%	0.33%	0.38%	0.44%	0.06%	(0.77)
3	0.38%	0.31%	0.21%	0.41%	0.25%	-0.13%	(-1.94)
4	0.28%	0.28%	0.22%	0.30%	0.37%	0.10%	(1.47)
5 High Abnormal Cash	0.33%	0.15%	0.23%	0.25%	0.38%	0.04%	(0.4)
High - Low	-0.04%	-0.03%	-0.12%	-0.24%	-0.16%		
	(-0.22)	(-0.25)	(-1.66)	(-2.74)**	(-1.62)		

Table 4 (continued)

US Funds

Portfolio	1 Low fund flows	2	3	4	5 High fund flows	High -Low	
1 low Abnormal Cash	-0.13%	-0.10%	-0.10%	-0.11%	-0.12%	0.013%	(0.26)
2	-0.10%	-0.10%	-0.10%	-0.08%	-0.11%	-0.013%	(-0.24)
3	-0.10%	-0.11%	-0.11%	-0.07%	-0.11%	-0.004%	(-0.07)
4	-0.07%	-0.08%	-0.09%	-0.07%	-0.13%	-0.059%	(-1.2)
5 High Abnormal Cash	-0.08%	-0.09%	-0.04%	-0.07%	-0.17%	-0.093%	(-1.41)
High - Low	0.05%	0.01%	0.06%	0.04%	-0.05%		
	(2.42)**	(1.19)	(2.45)**	(1.36)	(-1.98)*		

In Table 4 Panel A, consistent with Hypothesis Three, it shows that funds with higher abnormal cash holdings can outperform their peers in the US market. In the US, a long-short portfolio sorted by abnormal cash holdings offers a positive and significant CAPM alpha of 0.059% (t=1.86), a FF3 alpha of 0.065% (t=2.02) and a FF4 alpha of 0.06% (t=1.85). The coefficients of CAPM alpha and FF4 alpha are significant at the 10% level, and the coefficient of FF3 alpha is significant at the 5% level. In China, a long-short portfolio sorted by abnormal cash holdings offers an insignificant return spread at the 10% level. It suggests that strategies of abnormal cash holdings are more profitable in the US market.

In Panel B, I further sort fund portfolios by lagged fund flows and abnormal cash holdings. In China, the performance predictability of ACH is affected by lagged fund flows. Funds with high-lagged fund flows seem to demonstrate less skill in abnormal cash holding. It shows a negative and significant alpha of -0.24% (t=-2.74) at the 1% level in the fourth flow quintile. It implies that fund managers with price pressure from fund flows (Coval and Stafford, 2007) [12] might not make better decisions with abnormal cash.

In the US, the fund portfolio has a significant long-short FF4 alpha of 0.05% (t=2.42) at the 5% level under the lowest flow quintile. Also, it shows a relatively large alpha when flow increases from the lowest flow quintile to the medium flow quintile. It offers a FF4 alpha of 0.06% (t=2.45) at the medium (or third) flow quintile, which is significant at the 5% level. If it exceeds the medium flow quintile, the spread of ACH decays its significance or even shows some evidence to reverse in the highest flow quintile, which has a significant FF4 alpha of -0.05% (t=1.98) at the 5% level. The results show that, below the medium level of fund flow, funds with higher money flows tend to hold more abnormal cash, and they are more likely to outperform their peers. The results indicate that, first, fund managers holding large abnormal cash might be good at market timing. When new investment opportunities appear, they take these opportunities and purchase these stocks quickly with abnormal cash (Yan, 2013; Simutin, 2013) [43] [39]. Second, fund managers holding large abnormal cash might benefit from mitigating their price pressure. When funds experience money outflows, they might utilize abnormal cash to satisfy redemption costs (Chordia, 1996) [10]. Third, funds with the highest ACH could be a result of extreme inflows, and they might purchase too many of their existing stocks at an over-valued price (Simutin, 2013) [39]. This will finally erode their performance.

In sum, consistent with Hypothesis Three, liquidity management ability is also associated with smart money. As persistent money flows have a price impact on fund holdings (Coval and Stafford, 2007; Lou, 2012) [12] [32], I provide evidence that fund managers should actively control their cash holdings in dealing with persistent flows and that there is a tradeoff between persistent money flows and reducing price impact by holding abnormal cash. Also, I find that the performance predictability of abnormal cash holdings interacts with the smart money effect, especially in the US market.

5   Conclusion

In this study, I examine the determinants of cash holdings and explore how fund managers with different cash holdings adjust their future portfolios in the Chinese and US markets. First, I find that fund managers' cash holding in China is strongly related to non-risk factors such as fund size, fund age, return volatility, fund-report attention and active share, while in the US risk factors like market beta, size risk beta (SMB) and value risk beta (HML) show relative higher explanatory power for fund cash holdings. Second, I provide empirical evidence that fund managers with higher abnormal cash holdings tend more towards reducing their risk exposure in their future investments in the US, while fund managers in China show less sensitivity to systematic risk but tend to trade in investment (I/A) and profitability risk (ROE) from Hou, Xue, and Zhang (2014) [25]. Third, abnormal cash holdings positively attract fund flows in both China and the US fund markets. Finally, consistent with Simutin (2013) [39] and Graef et al. (2018) [22], I confirm that funds with high abnormal cash holdings outperform those with low abnormal cash holdings by a monthly FF3 alpha of 0.065% (t=2.02) in the US. I also find that the abnormal cash holdings' ability to predict fund performance is stronger under funds under the medium level of lagged flows. It suggests that a combination of smart money and better liquidity management skills could be an important signal to sophisticated investors in fund selection.

Overall, this study sheds light on comparing superior management skills based on abnormal cash holdings in China and the US. It gives more explanations of the decision mechanism of fund managers regarding cash management as US fund managers are more risk-sensitive while China fund managers rely more on non-risk factors. It confirms that abnormal cash holdings can indicate superior funds in the US and provides evidence that abnormal cash holdings lead to lower beta strategies in future investment in the US than in China. Fund managers should find a tradeoff between accommodating fund flows and investing with cash. Due to data availability, the analysis is limited to applying active skill measures in the US market. Further studies could include active measures with more comprehensive US fund holdings data. Alternative risk factors could also be employed to explore investment strategies that follow the above risk beta analysis.

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