Original Article

Foreign currency exchange rates and mutual fund cash flows

Received (in revised form): 30th January 2009

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ABSTRACT We provide new evidence linking foreign currency exchange rates and cash flows in and out of US-based international mutual funds. Our results suggest that changes in exchange rates and the associated volatility of those changes are important considerations when investors decide to purchase or redeem international mutual fund share. Specifically, we find that increased exchange rate volatility is positively and significantly related to 1- and 3-year net cash flows into and out of funds. We also document a negative relationship between short-term (previous year) and longer-term (previous 3 years) changes in foreign currency values.

Journal of Asset Management (2010) **11,** 314–320. doi:10.1057/jam.2009.37

Keywords: mutual funds; foreign currency; volatility

INTRODUCTION

In this article, we examine the impact of foreign exchange rates on cash flows in and out of international mutual funds. Foreign currency valuations may have played a role in international funds attracting US$392 billion in net new assets in 2007. Total net assets in international funds is only 14 per cent of the total assets in all funds, but almost half (44.3 per cent) of all new investments were to international funds in 2007.[1] Investors' beliefs about future exchange rates and stock returns provide a linkage between international mutual fund cash flows and exchange rate volatility and returns (Hau and Rey, 2006; Froot and Ramadorai, 2008). For example, mutual fund cash flows can be affected by investors trying to time the foreign exchange markets. Alternatively, investors may invest more in well-performing funds, for example the herding behavior discussed in Nanda *et al* (2004). Yet another explanation is that investors are behaving as asset allocators,

and the recent increase in international mutual fund cash inflows is unrelated to past stock or currency performance (Massa *et al*, 2004). Additionally, the extant literature suggests that investment opportunity (Nanda *et al*, 2004), monitoring expertise (Sirri and Tufano, 1998; Nanda *et al*, 2000) and fund manager ability (Ippolito, 1992) influence the flow of funds to and from mutual funds.

The relationship between cash flows and exchange rates is important to fund managers for predicting flows to and from the funds they manage. Turnover in funds can be problematic for managers and investors. Managers would like to know what type of liquidity demands they can expect and investors would like to gauge their capital gain exposure. If managers could predict the flows into and out of their funds, it could help with redemption planning, and could also help investors reduce unintended, but taxable, capital gains realizations. The relationships between cash flows to fund size and expenses could help managers implement efficient fee structures.

Utilizing a sample of 924 fund year observations from 149 funds over the 2001 through 2007 period, we examine the impact of exchange rate fluctuations on the cash flows into and out of international mutual funds. Specifically, we explore how foreign currency returns and their volatility impact cash flow in and out of mutual funds over 1- and 3-year periods. We find that shorter- and longer-term (that is 1- and 3-year) foreign exchange volatility is not significantly related to mutual fund cash flow volatility. However, we report positive and statistically significant (at the 1 per cent level) between foreign exchange rate volatility and the net cash flows into mutual funds for the 1- and 3-year periods. We also report a negative and significant relationship (again at the 1 per cent level) between prior exchange rate changes and current period cash flows into international mutual funds. These findings are consistent with the notion that international mutual fund investors employ exchange rate timing strategies.

We also examine how investment opportunities, prior period fund performance, monitoring quality and fund manager ability impact cash flows. We find that investment opportunities in foreign stock markets, proxied by the ratio of foreign stock index returns to S&P 500 index returns, are positively related to 1- and 3-year mutual fund cash flow volatilities. Likewise, the estimated coefficient for 1-year investment opportunity is positively related (at the 1 per cent level) to net cash flows into and out of international mutual funds. However, we report a negative (and significant at the 1 per cent level) relationship between investment opportunities and 3-year net cash flows. Again, these findings are more consistent with market timing efforts than asset allocation decisions. Not surprisingly, and consistent with Tufano and Sevick (1997), we find that prior period performance is related to mutual fund cash flows. Finally, we find no evidence to suggest that monitoring quality or manager ability is significantly related to cash flows.

The rest of this article is organized as follows. The next section discusses the sample-generation process and describes the sample, the 'Empirical Results' section discusses the empirical results, and finally the last section concludes.

SAMPLE GENERATION AND VARIABLE CONSTRUCTION

We employ the Morningstar Principia mutual fund and St Louis Federal Reserve (FRED) databases to construct the sample. The Morningstar database provides information on fund returns, total net assets, manager tenure, institutional ownership, expense ratios and manager tenure. From the Morningstar database we select funds with international equity investment objectives and at least 5 years of returns. Annual

Table 1: Variable definitions and primary source[a]

Variable	*Data source*	*Explanation*
Cash flow measures		
Volatility 1 Year	Morningstar/CRSP	Standard deviation of a fund's cash flow over a 1-year period
Volatility 3 Year	Morningstar/CRSP	Standard deviation of a fund's cash flow over a 3-year period
Net 1 Year	Morningstar/CRSP	Ratio of the fund's cash flow to the prior year's total net assets
Net 3 Year	Morningstar/CRSP	Ratio of the fund's 3-year cash flow to the total net assets of the prior 3 years
Fund characteristics		
Fund TNA	Morningstar/CRSP	Log of total net assets of fund ($MM)
Fund Age	Morningstar/CRSP	Log of number of years since the fund's inception
Institutional Holding	Morningstar/CRSP	Institutional class of mutual fund shares
Prior 1-Year Return	Morningstar/CRSP	Fund's previous 1-year return (%)
Prior 3-Year Return	Morningstar/CRSP	Fund's previous 3-year cumulative return (%)
Manager Tenure	Morningstar/CRSP	Time in years, managers' longevity at the fund
Investment Opportunity	Morgan Stanley/Yahoo	Ratio of 1 + the MSCI return to 1 + the S&P 500 return
FX measures		
FX Volatility 1 Year	St Louis Federal Reserve	Standard deviation of the returns of the applicable exchange rate over a 1-year period
FX Volatility 3 Year	St Louis Federal Reserve	Standard deviation of the returns of the applicable exchange rate over a 3-year period
FX Return 1 Year	St Louis Federal Reserve	Return of the applicable exchange rate over a 1-year period
FX Return 3 Year	St Louis Federal Reserve	Return of the applicable exchange rate over a 3-year period

[a]For a fund with multiple share classes, we compute the weighted average value (using TNA of each class), where the reported fund TNA is the sum of the TNA from all classes. Morningstar data are cross-checked or recomputed with the CRSP Mutual Fund database. In the case of discrepancies, information from the fund's form 485 is used.

exchange rate is gathered from the FRED database. Merging the Morningstar and FRED databases yields a sample of 924 fund year observations from 149 funds, representing five currencies, for the sample period of 2001–2007.

Cash flow volatility (Volatility) is the annualized standard deviation of monthly net cash flows. Because net cash flows are not directly observed, we use *Netflows* estimated from returns and fund assets. Consistent with prior studies, we compute net flows as:

$$Netflows_t = [TNA_{i,t} - TNA_{i,t-1} (1 + R_{i,t})]/TNA_{i,t-1}, \quad (1)$$

where $TNA_{i,t}$ is the total assets in (size of) the fund i at the end of year t and $R_{i,t}$ is the return of fund i during year t. We also compute 1- and 3-year annual measures of net cash flows in and out of the funds (Net 1 Year and Net 3 Year). Prior period performance is the annual returns in the previous year, $R_{i,t-1}$ and previous 3 years $R_{i,t-1,t-3}$ (Prior 1 Year and Prior 3 Year Returns).

We proxy the relative attractiveness of foreign investments by computing the ratio of the Morgan Stanley Capital Index (MSCI) World, excluding the United States, equity index to the S&P 500 index for the current 1- and 3-year periods. Exchange rate volatility is calculated by taking the standard deviation of the monthly percentage change in the exchange rate data over 1 and 3 years (FX volatility 1 Year and FX Volatility 3 Year). The percentage change in exchange rate is calculated by taking the percentage change in the annual exchange rate over 1 and 3 years (FX Return 1 Year and FX Return 3 Year). The remaining

control variables and their sources are presented in Table 1.

Sample description

Table 2 shows the statistics on our sample of 924 fund year observations. Cash flow volatility for international mutual funds was high during the sample period with mean 1- and 3-year values of approximately 32 per cent and 55 per cent, respectively. The standard deviations of the 1- and 3-year cash flow volatilities were likewise large (58 per cent and 109 per cent). The average fund experienced net cash outflows (−14 per cent and −55 per cent for 1 and 3 years, respectively) over the sample period, but again the standard deviations of the net cash flows are large.

The mean and median fund sizes (total net assets under management) of our sample are comparable to the universe of equity mutual funds (not reported). However, our sample-selection process returns funds that are approximately twice as old as the mutual fund universe. International mutual funds have performed well over the 2001 through 2007 sample period, with the prior 1-year return on the funds averaging approximately 12 per cent. Furthermore, international equity indices have outperformed the S&P 500 index, as evidenced by investment values exceeding one (investment opportunity is the ratio of foreign to domestic index returns). Finally, a large portion of international equity fund performance is a result of exchange rate movements, with a mean annual foreign currency appreciation of approximately 4 per cent.

Table 2: Descriptive statistics

	Mean	*Median*	*SD*
Cash flow measures			
Volatility 1 Year	31.81	13.29	58.15
Volatility 3 Year	55.27	21.89	109.02
Net 1 Year	−14.43	−15.29	23.59
Net 3 Year	−54.64	−44.56	231.07
Fund characteristics			
Fund TNA	361.4	42.00	1350.5
Fund Age	11.42	10.43	4.80
Institutional Holding	0.13		
Prior 1-Year Return	12.17	14.23	27.25
Prior 3-Year Return	36.89	39.17	53.66
Manager Tenure	3.84	3.0	3.26
Investment Opportunity 1	1.13	1.15	0.20
Investment Opportunity 3	1.33	1.43	0.47
FX measure			
FX Volatility 1 Year	6.21	6.35	1.99
FX Volatility 3 Year	6.74	7.03	2.01
FX Return 1 Year	3.50	3.84	9.87
FX Return 3 Year	6.74	4.85	19.14

This table shows descriptive statistics for our sample of 818 fund year observations covering the period from 2001 through 2007.

EMPIRICAL RESULTS

Mutual fund cash flow and foreign exchange volatility

Table 3 reports coefficients from ordinary least squares regression of cash flow volatility on exchange rate volatility. Columns 1 and 2 show regressions results for 1-year mutual fund cash flow volatility on 1-year foreign exchange rate volatility and returns. Columns 3 and 4 repeat the analysis for 3-year volatilities and returns.

The estimated coefficients for 1-year FX volatility and 1-year FX return are not significant in columns 1 or 2, suggesting that investors do not make short-term adjustments to their investment plans based on short-term exchange rates movements. Investment opportunity is positively and significantly related to cash flow volatility at the 10 per cent level. The results are also economically large (estimated coefficients of 38.03 and 36.14 in columns 1 and 2, respectively). The estimated coefficient for the prior year return performance of the funds (Prior 1 Year Return) is negative (−0.42 and −0.37 in columns 1 and 2) and statistically significant at the 5 per cent level, a result that is consistent with those of Nanda *et al* (2004).

Manager tenure and institutional ownership are not significantly related

Table 3: Mutual fund cash flow volatility and foreign exchange rates

	1-year cash flow volatility		*3-year cash flow volatility*	
	(1)	*(2)*	*(3)*	*(4)*
Intercept	55.31**	68.75**	216.44*	235.43*
	(1.99)	(2.36)	(5.62)	(5.34)
FX Volatility 1 Year	—	−1.63	—	—
		(−1.34)		
FX Volatility 3 Year	—	—	—	−3.67
				(−1.60)
FX Return 1 Year	−0.06	—	—	—
	(−0.24)			
FX Return 3 Year	—	—	−0.38	—
			(−1.54)	
Investment Opportunity	36.14***	38.03***	32.13**	37.86*
	(1.73)	(1.85)	(2.16)	(2.63)
Prior 1-Year Return	−0.37**	−0.42**	—	—
	(−2.16)	(−2.38)		
Prior 3-Year Return	—	—	−0.24***	−0.26**
			(−1.90)	(−2.06)
Manager Tenure	0.10	0.10	−1.28	−1.29
	(0.12)	(0.13)	(−0.90)	(−0.91)
Institutional Ownership	11.472	11.15	20.66	20.90
	(1.59)	(1.55)	(1.55)	(1.57)
Fund TNA	−5.29*	−5.11*	−4.56***	−4.87***
	(−3.56)	(−3.44)	(−1.65)	(−1.78)
Fund Age	−16.56**	−18.90**	−70.37*	−70.94*
	(−2.14)	(−2.40)	(−4.83)	(−4.85)
Adjusted R^2	6.0	6.3	8.5	8.5
Number of observations	540	560	560	560

*, ** and ***denotes significance at the 1%, 5% and 10%, respectively.
This table shows coefficients from OLS regressions of cash flow volatility on fund and foreign exchange measures for the complete sample of domestic equity index funds. The data cover the period from 2001 through 2007. Petersen (2008) fund-level clustered robust *t*-statistics are in parentheses. Variable definitions are provided in Table 1.

to 1-year mutual fund cash flow volatility in either model. These results are inconsistent with arguments that managerial skill and experience are important considerations in the fund-allocation decision-making process. These findings also suggest that investors with increased skill (that is institutional owners are likely more sophisticated investors) are no more or less likely to change cash flow allocations than smaller, more naïve investors. In terms of control variables, fund size (TNA) and fund age are both negatively and statistically significantly related to mutual fund cash flow volatility. Finally, the estimated coefficients in the 3-year models (columns 3 and 4) are similar in magnitude and significance to the 1-year results.

Mutual fund net cash flows and foreign exchange rates

Table 4 repeats the models of Table 3 but employs net cash flows scaled by fund size, as the dependent variable. We repeat the analysis, as interpreting cash flow volatility in isolation can be problematic. Columns 1 and 2 report results for 1-year net cash flow regressions. The most striking differences in Table 4 and Table 3 are the economically and statistically large estimated coefficients for 1-year FX volatility and 1-year FX returns. Specifically, the findings in column 1 point to a positive relationship between current year FX volatility and increased cash flows into international mutual funds. However, column 2 reports a negative coefficient for 1-year FX returns, suggesting that investors withdraw or reduce allocations

Table 4: Mutual fund cash flows and foreign exchange rates

	1-year net cash flow		*3-year net cash flow*	
	(1)	*(2)*	*(3)*	*(4)*
Intercept	−63.29*	−48.80*	−10.52	−313.26*
	(−7.31)	(−5.82)	(0.13)	(−3.67)
FX Volatility 1 Year	1.55*	—	—	27.12*
	(3.91)			(5.95)
FX Volatility 3 Year	—	—	—	—
FX Return 1 Year	—	−0.23*	—	—
		(−2.90)		
FX Return 3 Year	—	—	−1.52*	—
			(−2.80)	
Investment Opportunity	17.25*	19.34*	−132.74*	−120.43*
	(2.81)	(3.15)	(−4.61)	(−4.34)
Prior 1-Year Return	−0.33*	−0.41*	—	—
	(−6.18)	(−8.05)		
Prior 3-Year Return	—	—	0.02	0.56**
			(0.09)	(2.20)
Manager Tenure	0.49**	0.41***	0.76	0.02
	(2.03)	(1.72)	(0.28)	(0.01)
Institutional Ownership	1.34	1.23	−8.76	−0.04
	(0.58)	(0.53)	(−0.31)	(−0.00)
Fund TNA	−1.38*	−1.13*	−11.26**	−16.56*
	(−3.63)	(−2.92)	(−2.40)	(−3.65)
Fund Age	11.29*	8.68*	68.45**	118.90*
	(4.80)	(3.67)	(2.39)	(4.29)
Adjusted R^2	16.3	15.6	8.6	12.1
Number of observations	818	818	701	701

*, ** and ***denotes significance at the 1%, 5% and 10%, respectively.
This table shows coefficients from OLS regressions of cash flow volatility on fund and foreign exchange measures for the complete sample of domestic equity index funds. The data cover the period from 2001 through 2007. Petersen (2008) fund-level clustered robust *t*-statistics are in parentheses. Variable definitions are provided in Table 1.

to international mutual funds when foreign currencies increase in value relative to the US dollar.

The estimated coefficients for the prior period mutual fund return and investment opportunity are both positive and significant at the 1 per cent level. These results are similar to those reported in columns 1 and 2 of Table 3. The estimated coefficients for fund manager tenure are positive and significant, results that are consistent with the notion that manager reputation is important to investors. Similar to those in Table 3, the estimated coefficients for institutional ownership are insignificant.

The results for our longer-term measure of net cash flows in and out of international mutual funds, 3-year net cash flow, are reported in columns 3 and 4. The sign and significance of the FX metrics are similar to those in columns 1 and 2. However, the signs on prior period return performance and investment opportunity-estimated coefficients are opposite to the estimated coefficients on the 1-year measures of columns 1 and 2. These results are consistent with investors attempting to time markets (for example avoiding funds with high current period returns). The remaining control variable results are similar to those reported in columns 1 and 2.

Overall, the results presented in Tables 3 and 4 suggest that foreign currency valuations matter to international mutual fund investors. Investment opportunities in international equity issues are likewise important drivers of cash flows, as is fund manager tenure. Tables 3 and 4 also report evidence that is largely consistent with the idea of international mutual fund

investors attempting to time their investment decisions. Overall, these findings suggest that mutual fund purchases are not simply the result of allocation decisions.

CONCLUSION

In this article we examined the impact of foreign currency exchange rates on cash flows in and out of US-based international mutual funds. Understanding the relationship between exchange rates and investor investing decisions is important to investment advisors and mutual fund managers from the perspectives of liquidity and advising . Investment advisors can better serve client interests if they have greater insights into investor behavior. Portfolio managers, and by extension the shareholders in the funds they manage, benefit when cash flows and liquidity needs can be forecast more accurately, which enables them to minimize asset turnover and taxes.

Our results suggest that changes in exchange rates and the associated volatility of those changes are important considerations when investors decide to purchase or redeem international mutual fund share. Specifically, we find that increased exchange rate volatility is positively and significantly related to 1- and 3-year net cash flows into and out of funds. We also document a negative relationship between short-term (previous year) and longer-term (previous 3 years) changes in foreign currency values. In addition, we report a negative and statistically significant relationship between near term (prior year) international mutual fund performance and net cash flows. However, we also find a positive relationship between longer-term (prior 3 year) fund performance and net cash flows. The findings reported above suggest that investors attempt to time their international fund investments and fund withdrawals around anticipated changes in foreign currency and mutual fund values.

Finally, we examine the connection among fund manager tenure, institutional share ownership and net cash flows. We find a positive relationship (and significant at the 5 per cent level) between fund manager tenure, our proxy for perceived manager ability and 1-year net cash flows. We find no evidence to support the notion that institutional investors are more or less likely to time their funding decisions than smaller, individual investors.

NOTE

1. ICI. 'ICI Fact Book'. *Investment Company Institute.* 2008.

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