Home-Institution Bias. An Investigation Into Foreign Origin AMC Exits From India.

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Abstract

This study investigates whether home-institution bias against foreign origin asset management companies has contributed to their mass exit from the Indian market. Presence of home-institution bias should affect the mutual fund flow-performance relationship for the foreign origin AMC funds vis-à-vis the domestic AMC funds. With a sample of open-ended, diversified, domestic-equity mutual funds, I show that the foreign origin of the asset management company has significant adverse effect on the fund flow-performance relationship only for the top quintile performing funds. I also demonstrate that the fund flow-performance relationship has strong convexity. The two findings coupled together imply that the foreign origin AMC fund manager would attract less net flow relative to the domestic fund manager, while they both target top quintile performance, consequently heightening the fund risk positioning.

Keywords

1. Indian mutual fund market
2. Home-institution bias
3. Flow-performance
4. Convexity

JEL code: G23, G41, G11

1 Introduction

Since the beginning of 2008, thirteen foreign owned asset management companies (AMC) have exited the Indian mutual fund market (Table 1) despite strong industry asset growth[1]. The financial press coverage has primarily attributed these exits to product market and resource based explanations (Madia, 2016; Thakur and Antony, 2016). In this paper however, I investigate if a probable investor bias against foreign owned mutual fund houses has contributed to the exits. I base the enquiry on home-institution bias, a concpet introduced by McQueen and Stenkrona (2012)(hereafter referred to as MS) in a study on investor preference for indigenious funds in a mandatory Swedish retirement scheme. MS define home-institution bias as strong investor preference for domestic financial institutions. In behavioural finance literature, the concept of home bias for domestic assets has been well researched. For instance, the seminal French and Poterba (1991) article posits investor preference for domestic equities at the cost of international diversification benefits. However, little research has been done on investor preference for the indigenous financial institutions active in the domestic asset market.

In this paper, I investigate home-institution bias in the Indian mutual fund market by analysing the mutual fund flow-performance relationship. A bias against a category of mutual funds will adversely affect the fund flow-performance relationship for that category vis-à-vis the other categories of funds. This reasoning is supported by two related threads of literature. First is the premise that mutual fund flows are an aggregator of investor buy-sell decisions as emphasized by Christoffersen et al. (2014). Furthermore, empirical studies on detemerminants of mutual fund flow identify recent fund return to be highly significant in explaining mutual fund flow as evidenced by Sirri and Tufano (1998) and Ferreira et al. (2012). The fund flow-performance relationship is motivated by investor tendency to chase recent performance in expectation of return persistence or due to perceived ability to make deductions about fund management capabilities.

[1]According to the Association of Mutual Funds in India, the asset under management of the Indian mutual fund industry has increased from INR 4,187 trillion in March 2009 to INR 17,546 trillion in March 2017.

Table 1.
This table lists the merger, acquisition and exits in the Indian mutual fund market for 2000-2016. This table records the date of the transaction and name of the target firm and the acquirer, and domicile of the respective AMCs. Foreign origin AMCs that have divested off their Indian mutual fund business have been highlighted in italics. Joint Ventures are mutual fund companies, co-owned by both indigenous and foreign fund houses.

M&A Effective Date	**Target firm**		**Acquirer**	
	AMC Name	*Ownership*	*AMC Name*	*Ownership*
June 19, 2003	*Zurich India*	*Foreign*	HDFC	Joint Venture
April 30, 2004	PNB	Indian	Principal PNB	Joint Venture
May 14, 2004	SUN F&C India	Joint Venture	Principal PNB	Joint Venture
July 5, 2004	IL&FS	Indian	UTI	Indian
September 24, 2005	*Alliance Capital India*	*Foreign*	Aditya Birla Sun Life	Joint Venture
October 14, 2005	GIC	Indian	Canara Robeco	Joint Venture
May 31, 2008	*Standard Chartered*	*Foreign*	IDFC	Joint Venture
November 10, 2008	*ABN AMRO Asia*	*Foreign*	Fortis Investment India	Indian
February 16, 2010	DBS Cholamandalam	Indian	L&T Investment	Indian
October 22, 2010	Fortis Investment India	Indian	BNP Paribas India	Foreign
January 17, 2011	*Shinsei*	*Foreign*	Daiwa India	Foreign
August 18, 2011	*AEGON Private*	*Foreign*		
August 22, 2011	*Benchmark*	*Foreign*	Goldman Sachs India	Foreign
November 24, 2012	*FIL Fund*	*Foreign*	L&T Investment	Indian
November 16, 2013	*Daiwa*	*Foreign*	SBI Funds	Joint Venture
June 28, 2014	*Morgan Stanley Investment*	*Foreign*	HDFC	Joint Venture
October 11, 2014	*ING Investment India*	*Foreign*	Aditya Birla Sun Life	Joint Venture
January 31, 2015	*Pine Bridge Investments India*	*Foreign*	Kotak Mahindra	Indian
March 8, 2016	*Deutsche*	*Foreign*	DHFL Pramerica Asset Managers	Joint Venture
November 5, 2016	*Goldman Sachs India*	*Foreign*	Reliance Nippon Life	Joint Venture
November 26, 2016	*JPMorgan India*	*Foreign*	Edelweiss	Indian

Berggrun and Lizarzaburu (2015) and Mazur et al. (2017) adopt a similar approach to the one described in the previous paragraph, and use the fund flow-performance relationship to compare different category of mutual funds. In this paper, I examine the impact of foreign ownership of a fund's AMC on the fund flow-performance relationship in a sample of open-ended, diversified, domestic equity mutual funds available in India between 2000-2016. In line with the multi-country study by Ferreira et al. (2012), I find recent performance to be highly significant in explaining fund flows in India. Further, I find that there is no significant effect of foreign ownership of the AMC on fund flow-performance relationship. Interestingly, I also find that foreign AMC ownership has significant effect on the relationship between fund flow and fund age. The results are robust for several measures of fund's past performance, such as quarterly excess returns, annual excess returns and Carhart four factor alpha (Carhart, 1997), which is Fama-French three factor model (Fama and French, 1993) plus momentum. As another robustness test, the results hold for the sample of mutual funds that exclude joint ventures between foreign and domestic AMCs, unlike the main analysis where joint ventures are clubbed with the indigenous mutual funds.

Further, I investigate for convexity in the fund flow-performance relationship, as determined by Sirri and Tufano (1998). The sensitivity of fund flow-performance relationship across quintiles of performance measure has important implications. It provides deeper understanding into investor behaviour by deriving the flow-performance relationship for high and low performing funds seperately. The sensitivity analysis is also potentially relevant for fund managers, as fund flows effect fund size which in turn determines the fees earned by the fund management. Significantly higher sensitivity for top quintile funds may encourage the fund management to raise the fund riskiness. I extend the Sirri and Tufano (1998) analysis to investigate if foreign origin AMC funds face different fund flow-performance sensitivity in a statistically significant manner.

Firstly, I demonstrate the presence of convexity in this sample through two separate tests, a linear regression with second degree performance term and a piecewise linear regression for low, medium and high fund performance. Then, I determine the effect of

foreign origin on the flow-performance sensitivity by interacting the foreign dummy with the performance measures in the piecewise linear regression. I find that the interaction term with foreign dummy and top quintile performance measure is statistically significant and negative. This implies that for the top quintile performing funds, the flow-performance relationship is weaker for foreign origin AMC funds relative to the domestic ones. This result indicates home-institution bias at the top performance quintile for the Indian mutual fund market.

This study clarifies the role of investor preference in the foreign AMC exits. The fund flow-performance sensitivity analysis through piecewise linear regression further contributes to better understanding of home-institution bias concept. The rest of the paper is organised as follows. Section 2 provides a literature review of the important concepts used in this study. Section 3 details the sample selection methodology, data sources and provides descriptive statistics of the data. Section 4 compares the flow-performance relationship between the domestic and foreign funds and presents the results. Section 5 examines convexity in the fund flow-performance relationship across the two category of funds. Section 6 concludes.

2 Literature review

The concept of liability of foreignness forms an integral part of the internationalization literature. It is defined as the "additional costs that multinational enterprises have to face relative to their indigenous competitors when operating in foreign markets." (Denk et al., 2012). Several drivers of liability of foreignness have been identified in the literature, most of which are related to product market explanations and resource based view. The financial press coverage on the foreign AMC divestments (Madia, 2016; Thakur and Antony, 2016) echoes the LOF approach, where parent company's strategic imperatives, weak local distribution network, high operational cost and low profitability have been blamed for the foreign AMC exits. However, the role of the domestic investor preference for the foreign financial institutions has been left unexplored.

In financial and economic literature, the role of investor preference for domestic assets has been well recorded as the so called "home bias". Levy and Levy (2014) define home bias as the investor's tendency to have disproportionately high domestic asset allocation at the cost of diversification gains. However, little focus has been given within finance literature to understand investor preference for group of financial institutions and their products and services, according to their country of origin. However, this phenomenon has been well recorded in liability of foreignness literature (Denk et al., 2012) and as consumer ethnocentrism in marketing literature (Shankarmahesh, 2006). As stated in the previous section, MS introduced the concept of "home-institution bias" and defined it as an investor preference for domestic financial institutions at the cost of foreign origin financial institutions. They use a sample of mandatory Swedish retirement plans and find strong evidence of the investors preference for dealing with the domestic financial institutions. They observed that the domestic fund managers received 10 times the investment flow than foreign owned AMCs in the same fund category. In a sub-study, they control for asset based home bias by only considering foreign assets but the preference for domestic fund managers remained robust. As per MS the phenomenon of home-institution bias could be explained by the investors preference for dealing with the familiar. In line with this reasoning, they find the results are stronger with the less sophisticated investors. The dependant variable in MS is the fund flow relative to the fund category. In a cross sectional regression analysis, the dummy for domestic funds is found highly significant and past performance as a control variable is also found highly significant The data used in MS is as on the time of initiation of the mandatory retirement program.

This author believes that a discretionary, investment decision by investors over a period of time would provide a more useful understanding of home-institution bias in contrast to a cross sectional view with a mandatory retirement savings plan where the investor risk aversion would be highest, as is the case with the MS study. This study addresses this gap by using a panel data sample of open-ended, diversified, domestic equity mutual funds available in India for the period from 2000 to 2016. I investigate

home-institution bias in the Indian mutual fund market by using the empirically well established mutual fund flow-performance relationship. The fund flow-performance relationship originates from the literature on the determinants of mutual fund flow and has been applied in studies that compare between funds of different categories. In the next two paragraphs I briefly discuss the literature on determinants of fund flow and the literature on application of fund flow-performance relationship.

The antecedents of mutual fund flow is an important study topic as fund flow may be regarded as a proxy for aggregated investor preference. Christoffersen et al. (2014) in their review paper highlight several factors besides recent performance that have been recorded to effect fund flow. For instance, fund flow may be affected by the AMC the fund belongs to because of the likelihood of cross-fund liquidity as evidenced by Bhattacharya et al. (2013). While there are several factors that may influence fund flow but empirical literature suggests that the most significant one is the recent fund performance. Similar to the fund flow-performance result in MS, Ferreira et al. (2012) in a multi country study found past performance to be significant in explaining fund flow for a cross-country global model and also individually for the sample of 28 countries to varying degrees of significance. The sample of countries includes both mature and developing economies. They also find that the more financially advanced countries have lower non-linearity in the fund flow-performance relationship. Barber et al. (2005) find that in equity funds, the flow is negatively impacted by the fund loadings but expense ratios are not found significant. In this study, some of these factors are included as control variables to study the main effect of fund flow-relationship.

Several studies have utilised the fund flow-performance relationship. However, the most pertinant to this paper, is the use of the fund flow-performance relationship to compare between categories of mutual funds. Berggrun and Lizarzaburu (2015) in their paper on fund flow and performance of Brazilian equity mutual fund market found that Brazilian investor strongly chase past out-performance. Using this association, they compare retail and institutional funds and find that for retail funds the flow-performance relationship is convex, while the relationship is linear for institutional funds. The paper used

panel regression with firm and time fixed effects. Fund risk, fund size, fund-family size and fund age are the control variables for the study. The comparison between retail and institutional funds is achieved by interacting a dummy variable for institutional funds with the past performance covariate. Mazur et al. (2017) perform a similar analysis to compare retail and institutional mutual funds in United States. However, they use Fama and Macbeth regression methodology (Fama and MacBeth, 1973) on sub-samples of retail and institutional funds and compare the corresponding coefficients. Hazenberg et al. (2015) use the fund flow-performance relationship to study the impact of AMC branding on investor buy-sell decision. The paper finds that brand is a weaker determinant of fund flow than past performance, however the interaction term between the fund brand perception and past performance is significant. The results imply that the brand of the fund has effect on the fund flow-performance relationship through the effect on investor preference.

Lastly, investors may assess fund performance in several ways and therefore Barber et al. (2016) investigate the efficiency of various measures of performance in mutual fund flow-performance relationship for US mutual funds. They find that the investors favour risk adjusted measures for performance evaluation and the fund flows are best explained by the CAPM alpha. In this study I use both raw and risk adjusted measures of performance for the analysis.

3 Data description

This study uses ACE MF database by Accord Fintech to obtain fund related data. The data extracted is fund inception date to calculate fund age, net asset value (NAV) history to calculate fund performance measures, fund level and AMC level asset under management (AUM) used as proxy for fund size after log transformation. To calculate fund excess return, the market return data is taken from Bloomberg. Starting from the universe of all mutual funds available in the ACE MF database, the study sample excludes all non-equity funds such as debt, hybrid, asset allocation and commodity funds. Further,

within equity funds; index tracking funds, exchange traded funds, thematic and sector funds and closed ended funds including tax saver funds are excluded from the sample as their flow characteristics are different from open ended diversified funds. Fund of funds and international funds or funds with non-Indian equity exposure are also excluded from the study as the sample is focussed on domestic equity to rule out asset based home bias.

The mutual funds sample for this study is comprised of 187 primary schemes of open ended, actively managed, diversified, domestic equity mutual funds, available to Indian investors in between 2000-2016 period. The list of the fund universe is not included here due to space constraint and is available on request . Out of the 187 funds, 4 funds were offered as closed ended funds and then later converted to open ended funds. The data for closed ended period for these funds is excluded from the study. Further, out of the 187 funds, 16 funds were acquired or merged with another AMC and were renamed. To account for the merger related effect, the data for a period before and after the quarter of merger is excluded from the study. In the final panel data sample, with the missing data entries removed, I further discard observation where the quarterly flow data is greater than 150% or less than -75% to discount for unaccounted extreme events. I also exclude fund that have average AUM less than INR 15 crores for the study period, to avoid extreme values in the analysis.

3.1 Performance measurement and fund flows

This study uses quarterly and annual raw excess returns and risk adjusted Carhart four factor alpha as the measures of fund performance. Raw returns are holding period returns calculated from the adjusted NAV (equation 1). The corresponding excess return is raw fund return less the appropriate benchmark total return. Adjusted NAV is calculated with the assumption that dividends are reinvested after they are paid out. I use raw excess return for the primary analysis as that is the figure most accessible to the retail investors.

$$R_{i,t} = \frac{NAV_{i,t}}{NAV_{i,t-1}} - 1. \tag{1}$$

The Carhart four factor alpha uses market, size, value, and momentum factors to calculate the risk adjusted fund performance. The alpha measure is calculated as by Ferreira et al. (2013) , while the risk factors for Indian market are obtained from Agarwalla et al. (2013). The first step in alpha estimation is to run a regression using past 36 periods of fund excess return against the corresponding risk factors to estimate the betas. In the second step, the estimated betas and the realised risk factors are used to calculate the estimated fund return for the current period. Fund alpha for the current period is then calculated as the difference between the realised return and the estimated return. The above described steps are performed for all the funds for all the periods.

To calculate the flow measure we follow the standard methodology in the fund flow-performance literature, as described by Sirri and Tufano (1998). The only difference is that instead of total net assets (TNA), I use asset under management. AUM can increase due to either new money coming into the fund or due to increase in the market value of the asset holdings. As the focus of the study is to observe the net fund cash-flow, the Flow variable is calculated as the percentage increase in the AUM from time $t-1$ to time t, net of the raw total return of the fund during this period (equation 2).

$$Flow_{i,t} = \frac{AUM_{i,t} - (1 + R_{i,t}) * AUM_{i,t-1}}{AUM_{i,t-1}}. \tag{2}$$

Summary statistics for fund flow for each year are provided in Table (2). The table lists the descriptive statistics of the quarterly observations for net fund flow for the full sample. The number of observations in the early 2000s form a small proportion of the overall sample due to sparse data availability. The median flow has been negative in most years however 2015 witnessed strong positive median flow. Interestingly, since 2015 three of the most prominent financial institution viz. Deutsche, Goldman Sachs and JPMorgan have exited the Indian mutual fund market.

3.2 Control variables

The control variables included in this study are log transform of fund AUM as a proxy for fund size, log transform of total AUM of the fund AMC, riskiness of the fund measured

Table 2.
This table lists the descriptive statistics of the quarterly observations for net fund flow by year, for the full sample. N is the number of observations in the respective year.

	N	Min.	Median	Mean	Max.	Std. Dev.
2000	2	1%	4%	4%	7%	4%
2001	7	-5%	-3%	-2%	-1%	2%
2002	8	-17%	2%	2%	22%	11%
2003	41	-57%	-10%	3%	150%	45%
2004	161	-55%	0%	6%	135%	32%
2005	234	-72%	-5%	-2%	92%	22%
2006	319	-55%	-4%	-1%	102%	20%
2007	355	-66%	-6%	-4%	107%	18%
2008	431	-40%	-1%	1%	89%	11%
2009	467	-61%	-3%	-1%	126%	15%
2010	506	-54%	-4%	-3%	53%	12%
2011	545	-41%	0%	2%	149%	12%
2012	562	-51%	-6%	-4%	101%	12%
2013	572	-64%	-5%	-3%	147%	11%
2014	580	-29%	-2%	5%	145%	20%
2015	613	-34%	2%	6%	115%	15%
2016	640	-74%	0%	2%	71%	13%

by the standard deviation of the past twelve month return and log transform of the fund age (Sirri and Tufano, 1998; Berggrun and Lizarzaburu, 2015). The size variables are included as control variables as larger funds and fund houses are expected to attract more flow (Christoffersen et al., 2014). Fund age is included on a similar line of argument as fund size. I ignore the fund fees and expense data for this study because of the sparse data available and low time series and cross sectional variation in the available data. The covariates for the study are lagged by a single time period. The size variables, fund age and standard deviation are as on the end of the previous quarter, and the performance measures are calculated for the duration of the lagged quarter. I record the control variables as on the end of the lagged quarter due to the realistic assumption that the investor will use the latest values available for making a buy-sell decision.

3.3 Descriptive statistics

Out of the total 6043 fund-quarter observations, about 21% are of foreign owned funds while 30% belong to fully indigenous funds. These values are recorded from an unbalanced

panel of 187 funds over a period of 68 quarters starting from Q1 2000 to Q4 2016. The remaining observations are of funds from joint venture between foreign and indigenous AMCs. The performance measures used in the study are raw excess returns on a quarterly basis (Q) and on an annual basis (A) and risk adjusted Carhart four factor alpha. The study has the largest sample size for quarterly return performance measure, which goes down to nearly 79% of the full sample, when the four factor alpha is used as performance measure. The median and mean net flow for the foreign AMC funds is lower than the domestic AMC funds. Interestingly, the foreign AMC funds have similar or better mean and median values for all performance measures compared to the domestic funds. The risk characteristics for the two categories of funds are on an average similar to each other. However the foreign owned AMCs are much smaller in asset size and have younger funds than the domestic AMCs. The fund asset size is similar across the foreign and domestic AMCs (Table 3). The correlations between the covariates are presented in Table (4).

4 Investigating home-institution bias

It is empirically well established that investors chase past performance when making their buy-sell decisions expecting return persistence (Ferreira et al., 2012; Christoffersen et al., 2014). Therefore it intuitively follows that a negative perception about a fund will alter the investor's buy sell decision about that particular fund. If the negative perception of a fund category is generally held by the entire investor class due to a form of home bias towards foreign institution, then the the bias would be reflected in the net flow to the fund adjusted for the fund's performance. In other words, a fund belonging to a foreign AMC would have to perform better than a domestic AMC fund to attract same net fund flow. This argument in terms of the regression model for the fund flow-performance relationship would imply that the coefficient on the performance measure for the foreign funds would have to be different from the coefficient on the performance measure for the domestic funds, in a statistically significant manner. Alternatively, in a regression model with interaction terms, the interaction term between fund performance and a dummy for

Table 3.
This table lists the descriptive statistics of the variables used in the study. *Panel A* summarizes the full sample while *Panel B* and *Panel C* summarize foreign owned and domestic funds (including joint ventures) data respectively. Summary statistics include number of observation, *N*, minimum, *Min.* and maximum, *Max.*, of the observed value. The dependant variable, *Flow*, is recorded contemporaneously while explanatory variables are lagged and recorded as on end of previous quarter. The summary statistics for control variables are presented both for log transforms and level values *(In brackets. Shown for illustrative purpose.)*

Dependant var.(t)		Performance measure (t-1)			Control variables (t-1)			
	Flow	Alpha	Excess Ret. (A)	Excess Ret. (Q)	Risk	Fund size	AMC size	Age
Panel A: Full Sample								
N	6043	4715	5718	6043	6043	6043	6043	6043
Min.	-74%	-39%	-85%	-60%	1%	-0.4	3.2	0.7
						(1)	(25)	(2)
Median	-2%	2%	12%	0%	19%	6	10.2	4.4
						(400)	(26228)	(85)
Mean	0%	2%	18%	1%	22%	5.9	10.1	4.3
						(1001)	(46682)	(98)
Max.	150%	19%	188%	56%	89%	9.8	12.5	5.9
						(18159)	(272871)	(359)
Std.Dev.	16%	4%	33%	5%	10%	1.5	1.4	0.9
						(1733)	(49360)	(68)
Panel B: Foreign								
N	1250	940	1175	1250	1250	1250	1250	1250
Min.	-74%	-9%	-81%	-24%	5%	2	5	1.1
						(7)	(152)	(3)
Median	-3%	3%	14%	1%	18%	6	10.1	4.3
						(406)	(23946)	(75)
Mean	-1%	3%	17%	1%	22%	5.9	10	4.2
						(982)	(35760)	(90)
Max.	149%	17%	166%	22%	58%	9.4	12.3	5.6
						(11651)	(211618)	(273)
Std.Dev.	17%	4%	32%	4%	9%	1.6	1.2	0.9
						(1471)	(33009)	(65)
Panel C: Domestic								
N	4793	3775	4543	4793	4793	4793	4793	4793
Min.	-64%	-39%	-85%	-60%	1%	-0.4	3.2	0.7
						(1)	(25)	(2)
Median	-2%	2%	12%	0%	19%	6	10.2	4.5
						(399)	(28125)	(88)
Mean	1%	2%	18%	1%	22%	6	10.1	4.3
						(1006)	(49531)	(100)
Max.	150%	19%	188%	56%	89%	9.8	12.5	5.9
						(18159)	(272871)	(359)
Std.Dev.	16%	4%	33%	5%	10%	1.5	1.5	0.9
						(1795)	(52428)	(69)

Table 4.
This table reports the correlation coefficients between the covariates including quarterly return performance measure, fund riskiness, and log transforms fund AUM, fund family AUM and fund age. All correlations are significant at the 5 percent level except those with the superscript ^{n} which are insignificant.

	Perf. (Q)	Risk	Fund size	AMC size	Fund age
Perf. (Q)	1.00				
Risk	0.01^n	1.00			
Fund size	0.03	-0.09	1.00		
AMC size	0.03	-0.14	0.53	1.00	
Fund age	0.02^n	-0.12	0.29	0.29	1.00

foreign ownership status would have to be significant. In this section, I first demonstrate that the fund flow-performance relationship holds in India. Subsequently, I show that the fund flow-performance relationship is not impacted by the foreign ownership of the fund by performing a panel data regression having an interaction term with a foreign ownership dummy, along with fund and time fixed effects.

4.1 Flow-performance relationship

I follow the standard formulation for analysing the multivariate flow-performance relationship (equation 3). The primary variable of interest is the lagged performance variable ($Perf.$) for the fund i and time period $t-1$. The performance measures include quarterly excess return, annual excess return and the Carhart four factor alpha. As stated earlier, the control variables include fund riskiness calculated as the annualised standard deviation of the past 12 months returns, fund size and fund-family size as the respective log transform of the AUM values, and fund age estimated in log of months since fund inception.

$$Flow_{i,t} = \beta_1 Perf_{i,t-1} + \beta_2 Controls_{i,t-1} + FixedEffects + \varepsilon_{i,t}. \tag{3}$$

The regression results with fund and quarterly time fixed effects and standard errors adjusted for clustering for funds are presented in Table (5) regression number 1, 2 and 3. I use the fixed effect model as the Hausman test suggests fixed effects in the model

(not reported). The results of equation (3) presented in Table (5), are in line with the established results. All performance measures are found to be highly significant and have a positive effect on the fund flows. Fund size is found highly significant but negative in sign, which implies that investors switch out as a fund grows larger in size.

4.2 Foreign AMC funds and flow-performance relationship

To test for the effect of foreign ownership on the fund flow-performance relationship I use the standard formulation in equation (3) and introduce interaction terms between the covariates and a dummy variable Dm_i which takes the value 1 if the fund i is from a foreign AMC and 0 otherwise. The panel regression is as formulated in equation (4). The interaction terms allow us to study the effect of foreign ownership on the fund flow. The regression results with fund and quarterly time fixed effects and standard errors adjusted for clustering for funds are presented in Table (5) regression number 4, 5 and 6.

$$\begin{aligned} Flow_{i,t} = \beta_1 Perf_{i,t-1} + \beta_2 Controls_{i,t-1} + \beta_3 Dm_i Perf_{i,t-1} + \beta_4 Dm_i Controls_{i,t-1} \\ + Fixed\ Effects + \varepsilon_{i,t}. \end{aligned} \tag{4}$$

As before, I use the fund and time fixed effect model based on the Hausman test (not reported). The significance of the main effects remains the same but more interestingly the interaction term between foreign dummy and past performance is not found significant across all measures of performance. This implies that the fund flow-performance relationship for a foreign AMC fund is not different from the fund flow-performance relationship of a domestic fund in a statistically significant manner. As the fund flow is not different between foreign and domestic funds for given performance, I argue that the investors do not manifest preference to a category of fund based on the fund AMC origin, in a statistically significant manner. In other words, this test fails to show home institution bias in Indian mutual fund investors.

Interestingly, the interaction term between fund age and foreign dummy is significant and positive for all three measures of fund performance, while the main effect of fund age is only significant with annual return as performance measures. This likely implies

Table 5.
This table reports coefficients of the panel regression of the quarterly fund flow on the lagged fund performance measures and control variables and the interaction term between the covariates and a dummy variable Dm_i, which takes the value 1 if the fund i is from a foreign AMC and 0 otherwise. The control variables are fund riskiness, fund size and fund family size and fund age. The analysis includes fund and quarter fixed effects. Regression 1 and 4 report regression result with quarterly excess returns as the performance measure and regression 2 and 5 report for annual excess returns. Regression 3 and 6 has Carhart four-factor Alpha as the performance measure. Regression 1, 2 and 3 present the results for regression analysis for the main effects. Regression 4, 5 and 6 present the results for regression analysis including the interaction effects.The p-values are provided in the brackets below coefficient estimates and are based on the standard errors clustering by fund.

	1	**2**	**3**	**4**	**5**	**6**
$Perf.$	0.694	0.376	0.672	0.683	0.375	0.671
	(0)	(0)	(0)	(0)	(0)	(0)
	***	***	***	***	***	***
Risk	-0.046	0.024	0.043	-0.018	0.038	0.049
	(0.54)	(0.74)	(0.56)	(0.8)	(0.6)	(0.52)
Fund size	-0.035	-0.034	-0.029	-0.038	-0.038	-0.032
	(0)	(0)	(0)	(0)	(0)	(0)
	***	***	***	***	***	***
AMC size	0.007	0.013	0.002	0.012	0.019	0.009
	(0.55)	(0.23)	(0.9)	(0.25)	(0.06)	(0.48)
Fund age	0.018	0.042	0.039	0.006	0.028	0.009
	(0.06)	(0)	(0.2)	(0.55)	(0.03)	(0.77)
		***				
Dm_i*$Perf.$				0.044	0.003	0.040
				(0.77)	(0.9)	(0.8)
Dm_i*Risk				-0.127	-0.101	-0.025
				(0.03)	(0.07)	(0.69)
Dm_i*Fund size				0.021	0.020	0.005
				(0.05)	(0.11)	(0.78)
Dm_i*AMC size				-0.040	-0.045	-0.040
				(0.05)	(0.02)	(0.05)
Dm_i*Fund Age				0.057	0.065	0.146
				(0.01)	(0.01)	(0)
				**	**	***
N	6043	5718	4715	6043	5718	4715
R-Square	0.061	0.099	0.038	0.070	0.107	0.049
Significance code	*** 0.001	** 0.01				

that investors do not account for fund age when making a buy-sell decision in general. However, the significant interaction term suggests that for foreign origin AMC funds, fund age makes a positive impact on fund flow vis-à-vis the domestic funds.

To address the concern that the presence of joint venture AMCs may bias the results, the panel regressions are performed for a sub-sample that only includes foreign owned AMC funds and fully indigenous funds. The joint ventures are removed from the sample and the rest of the methodology is the same as described for the regressions for equation (4). The results are presented in Table (6) and are in line with the main results presented in Table (5).

5 Home-institution bias across performance quintiles

Presence of convexity in the fund flow-performance relationship has important implication for understanding investor buy-sell behaviour and fund manager risk taking behaviour, as briefly discussed in the introduction section. Sirri and Tufano (1998) found evidence of non-linearity in fund flow-performance relationship for US mutual funds and Ferreira et al. (2012) extend the analysis in a cross-country study. For this study, I use the flow-performance sensitivity analysis to investigate home-institution bias across different quintiles of fund performance, which enables a finer understanding of home-institution bias. For this purpose, I first establish the presence of convexity in the fund flow-performance relationship with two separate tests. Subsequently, I demonstrate that at the top quintile with best performing funds, the fund flow-performance relationship is adversely affected by the foreign origin of the fund AMC.

5.1 Fund flow-performance convexity

I add a second degree performance term to equation (3) to test for convexity. The resulting model is presented in equation (5). The primary variable of interest is $Perf^2_{i,t-1}$ for the fund i and time period $t-1$. The performance measures is restricted to annual excess return. The control variables include fund risk calculated as the annualised standard

Table 6.
This table reports coefficients of the panel regression of the quarterly fund flow on the lagged performance measure and control variables and the interaction term between the covariates and a dummy variable Dm_i, which takes the value 1 if the fund i is from a foreign AMC and 0 otherwise. The control variables are fund risk, fund size and fund family size and fund age. The analysis includes fund and quarter fixed effects. The p-values are corrected for standard errors clustering by funds. The sample for this analysis excludes joint ventures between domestic and foreign origin AMCs. Regression 1 reports regression result with quarterly excess returns as the performance measure and regression 2 reports for annual excess returns. Regression 3 uses Carhart four-factor Alpha as the performance measure.

	1	**2**	**3**
$Perf.$	0.438	0.312	0.390
	(0.005)	(0)	(0.003)
	**	***	**
Risk	0.042	0.080	0.061
	(0.581)	(0.301)	(0.472)
Fund size	-0.025	-0.021	-0.007
	(0.024)	(0.041)	(0.632)
AMC size	0.002	0.014	0.008
	(0.808)	(0.094)	(0.311)
Fund age	-0.002	0.015	-0.060
	(0.879)	(0.415)	(0.241)
Dm_i*$Perf.$	0.208	-0.001	0.265
	(0.248)	(0.979)	(0.17)
Dm_i*Risk	-0.150	-0.141	-0.030
	(0.03)	(0.037)	(0.703)
Dm_i*Fund size	0.005	0.001	-0.022
	(0.681)	(0.965)	(0.223)
Dm_i*AMC size	-0.043	-0.052	-0.054
	(0.037)	(0.008)	(0.007)
		**	**
Dm_i*Fund Age	0.061	0.077	0.195
	(0.005)	(0.004)	(0)
	**	**	***
N	3073	2885	2347
R-Square	0.053	0.078	0.036
Significance code	*** 0.001	** 0.01	

deviation of the past 12 months returns, fund size and fund-family size as the respective log transform of the AUM values, and fund age estimated in log of months since fund

inception.

$$Flow_{i,t} = \beta_1 Perf_{i,t-1} + \beta_2 Perf^2_{i,t-1} + \beta_3 Controls_{i,t-1} + FixedEffects + \varepsilon_{i,t}. \quad (5)$$

The corresponding regression results for equation (5), with fund and quarterly time fixed effects and standard errors adjusted for clustering for funds are listed in table (7) regression number 1. The second degree term $Perf^2_{i,t-1}$ coefficient is found significant at 5% level, which implies the presence of non-linearity in the flow-performance relationship.

However, the test in equation (5) only indicate non-linearity but does not allow a sensitivity analysis. For that purpose, I follow the specification in Sirri and Tufano (1998) and calculate the fractional fund performance ranks of annual returns in $t-1$ for all funds for each quarter. The resultant fractional performance measure is then decomposed into three piecewise variables viz. *High* representing the top quintile performing funds, *Low* representing the bottom quintile performing funds and lastly *Mid* representing funds that belong in the second to fourth quintile (equation 6).

$$\begin{aligned} Low_{i,t-1} &= min(0.2, Rank_{i,t-1}) \\ Mid_{i,t-1} &= min(0.6, Rank_{i,t-1} - Low_{i,t-1}) \\ High_{i,t-1} &= Rank_{i,t-1} - Low_{i,t-1} - Mid_{i,t-1}. \end{aligned} \quad (6)$$

This piecewise decomposition of performance allows determination of the flow-performance relationship at different levels of performance, from worst performing to best performing funds. The coefficients on *Low*, *Mid* and *High* in the model specified in equation (7) represent different fund flow-performance sensitivity. The performance measures is restricted to annual excess return and the control variables remain the same as specified for the model in equation (5)

$$Flow_{i,t} = \beta_1 Low_{i,t-1} + \beta_2 Mid_{i,t-1} + \beta_3 High_{i,t-1} + \beta_4 Controls_{i,t-1} + Fixed\ Effects + \varepsilon_{i,t}. \tag{7}$$

The corresponding regression results for equation (7), with fund and quarterly time fixed effects and standard errors adjusted for clustering for funds are listed in table (7) regression number 2. The results are found highly significant for *Mid* and *High* variables and the slope on *High* is much steeper than on *Mid*, although both are positive. This implies that the Indian investors prefer last year winners, and the chase for past winners is particularly strong for the top quintile performing funds. The model in equation (7) also allows to check for convexity in the overall fund flow-performance relationship by conducting a Wald test for the equality of the *High* and *Low*. The p-value for the test is reported in table (7) regression number 2 and suggests statistically significant convexity in the overall fund flow-performance relationship.

5.2 Foreign AMC funds and fund flow-performance convexity

To test for the effect of foreign ownership on the fund flow-performance relationship across quintiles, I use the piecewise linear regression formulation presented in equation (7) and introduce an interaction terms between the covariates and a dummy variable Dm_i which takes the value 1 if the fund i is from a foreign AMC and 0 otherwise. The panel regression is as formulated in equation (8). The interaction terms allow us to study the effect of foreign ownership on the fund flow across various fund performance levels. The regression results with fund and quarterly time fixed effects and standard errors adjusted for clustering for funds, are presented in table (7) regression number 3.

$$\begin{aligned} Flow_{i,t} = {} & \beta_1 Low_{i,t-1} + \beta_2 Mid_{i,t-1} + \beta_3 High_{i,t-1} + \beta_4 Controls_{i,t-1} + \beta_5 Dm_i Low_{i,t-1} \\ & + \beta_6 Dm_i Mid_{i,t-1} + \beta_7 Dm_i High_{i,t-1} + \beta_8 Dm_i Controls_{i,t-1} + Fixed\ Effects + \varepsilon_{i,t}. \end{aligned} \tag{8}$$

The main effects remain the same as in the model for equation (7), but very interestingly the interaction term between the between foreign dummy and *High* is found highly significant and negative. This implies that at the top quintile, with best performing funds, the fund flow-performance relationship is adversely affected by the foreign origin of the fund AMC. In another result, the interaction term between foreign dummy and fund age is highly significant and positive, echoing the result for the main analysis for equation (4), presented in table (5).

6 Results and Conclusion

In this paper I analyse the fund flow-performance relationship to investigate for home-institution bias in Indian mutual fund market. To begin with, I demonstrate that past fund performance is highly significant in explaining fund flows in India. On further analysis, I find that the fund flow-performance relationship for the foreign origin AMC funds is not different from domestic AMC funds, in a statistically significant manner (Table 5). This suggests, that on an average, the Indian investor are not affected by home-institution bias.

Subsequently, I conduct a piecewise linear regression with the decomposed performance measure of fractional fund performance ranks of excess annual returns. This enables a sensitivity analysis of flow-performance relationship across different quintiles of fund performance. As presented in table (7), I find that the fund flow-performance relationship is non-linear across the performance quintiles. The flow-performance relationship is significant for the top and medium quintiles performing funds. In addition, the flow-performance relationship for the top quintile is far stronger than the medium quantiles one. Most interestingly, I find that for the top quintile funds, the flow-performance relationship for the foreign origin AMC funds is different from domestic AMC funds, in a statistically significant and adverse manner. This implies that home-institution bias is effective at the top quintile performance fund level where the fund flow-performance relationship is the strongest. This implies that at the top quintile level, each percentile

rank increase, attracts the highest net flow for similar performance improvement across other quintiles. However, this relationship at the top quintile is weaker in a statistically significant manner for foreign origin AMC funds.

As discussed by Ferreira et al. (2012), the flow-performance convexity effects the risk positioning of fund managers, as performance effects fund size which in turn determines the management fees. As described above, the strong convexity in Indian mutual fund market may motivate the equity fund managers to aim for top quintile performance. However, due to home-institution bias in the top quintile funds, the foreign origin AMC funds on an average attract lesser flow for similar outperformance than domestic funds.

However, in another result the effect of foreign origin AMC funds in fund flow-age relationship is positive, in a statistically significant way. This implies that Indian investors evaluate fund characteristics differently for foreign funds and familiarity through fund age is more important for foreign origin AMC than for domestic funds. In summary, the the results seem to suggest that foreign AMC exits may have been influenced by presence of home-institution bias at the top quintile performing funds. However, the evidence also suggest that home-institution bias is not active in the other quintiles and a more conservative fund management approach may have helped the foreign AMCs.

Table 7.
This table reports coefficients of the panel regression of the quarterly fund flow on the lagged annual excess return. The control variables are fund riskiness, fund size and fund family size and fund age. The analysis includes fund and quarter fixed effects. The p-values are corrected for standard errors clustering by funds and are presented in brackets. Regression number 1 tests for convexity in the fund flow-performance relations through a second degree performance term. Regression number 2 reports for piecewise regression of High, Medium and Low decomposition of fractional fund performance ranks for annual excess return for each quarter. Regression number 3 is regression number 2 in addition of an interaction term between the covariates and a dummy variable Dm_i, which takes the value 1 if the fund (i) is from a foreign AMC and 0 otherwise.

	1	**2**	**3**
$Perf.$	0.437 (0) ***		
$Perf.^2$	-0.066 (0.049) *		
Low		-0.047 (0.376)	-0.102 (0.059)
Mid		0.111 (0) ***	0.112 (0) ***
High		0.629 (0) ***	0.71 (0) ***
Risk	0.077 (0.287)	0.069 (0.289)	0.08 (0.219)
Fund size	-0.034 (0) ***	-0.035 (0) ***	-0.04 (0) ***
AMC size	0.013 (0.228)	0.011 (0.342)	0.019 (0.096)
Fund age	0.041 (0.001) ***	0.042 (0) ***	0.029 (0.017) *
Dm_i*Low			0.33 (0.054)
Dm_i*Mid			-0.014 (0.675)
Dm_i*High			-0.426 (0.003) **
Dm_i*Risk			-0.063 (0.203)
Dm_i*Fund size			0.024 (0.038) *
Dm_i*AMC size			-0.046 (0.019) *
Dm_i*Fund Age			0.062 (0.008) **
N	5718	5718	5718
R-Square	0.101	0.117	0.128
Wald test: High = Low (p-value)		0.00 ***	
Significance code	*** 0.001	** 0.01	* 0.05

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