World Journal of Social Sciences
Vol. 2. No. 1. January 2012. Pp. 154 - 173

Evaluation Of European Mutual Funds Performance

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Our primary objective is to suggest some winning styles of investment for investors and proposing some good benchmarking techniques to managers. In other words, we can say that which stock picking skill of manager can better earn before-fee excess return? We applied Carhart's four factor model on 122 equity mutual funds domestically invested in France from 1990 to 2009. Our results indicate that measuring risk with use of the established pricing models is indeed problematic because it is suitable to some markets but not for all and more analytical and empirical work is needed to develop universally adapted risk factors.

Keywords: Equity mutual funds, Carhart regression model, management fee.

1. Introduction

In European market, the growing importance of funds expenses for investors' investment decisions needs some attention. From literature review, it is obvious that European fund market has been criticized for under performance and authors have attributed number of reasons in this regard. Keeping in view the uniqueness of European fund market with respect to management styles of institutional investors and expectations of individual investors, we want to analyze the performance of some domestically invested funds in this specific region with having a keen look at expenses. We want to suggest some winning styles of investment for investors and proposing some good benchmarking techniques to managers. Next phase of our research will highlight the underlying relationship of funds' performance and fees charges by fund managers; which will help investors specifying some pattern of fees structure. Here it must be noted that some studies have concluded the higher of fees is being charged by funds in spite of increasing competition. It can be inferred very easily that the managers charge high fees for having some inside information to attain better performance over market. However, some US based researches found high fees is more related to under-performing funds. This gives us a direction to work out situation in European market. We want to take this problem more diverse while taking in account the performance of funds before deduction of fees charged by managers to know the before-fee performance estimation of European funds. Our sample universe is comprised of equity mutual funds of France which is one of the most important funds markets in Europe. Our primary objective is to find out the explanatory power of our benchmark for portfolios considering excess returns before deduction of 'management fee'. Underlying objective is to find out successful performance style of portfolio structuring in European market. In other words, we can say that which stock picking skill of manager can better earn before-fee excess return? Unlike US based mutual funds, we found higher alpha values which show the existence of impact of managerial skills in European market. Our study is pioneer to

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find out the relation between before-fee performance and Fee paid by investors in European market. Our results presents significantly negative relation exists between fund's before-fee performance and the fee they charge to investors, which is in accordance to findings of Gil-Bazo & Ruiz-Verdú (2009).

In next section, I have provided rich literature review regarding evaluation of mutual funds. Then we will move towards explain methodology and data description, followed by findings taken from empirical analysis and finally, in last section conclusion will be drawn with future prospects.

2. Literature Review

An intensive literature has been documented till date by various researchers regarding mutual funds performance. They have highlighted numerous factors influencing mutual fund performance. It has been specified very earlier by Roll (1978); Reilly and Akhtar (1995); and Grinblatt and Titman (1994) that performance evaluation with capital asset pricing models are likely to be sensitive to the benchmark choice. The decision of selecting benchmark can have a significant effect on valuation and the evaluation of portfolio performance. Berk (2009) presented the idea of self-designated benchmark. Matallin and Saez (2007) have supported the idea to evaluate portfolios with different characteristics and factors of benchmark.Carhart (1997) and Gruber (1996) analyzed US fund preferences and reported that funds prefer smaller stocks and stocks with low book-to-market ratios.

In our research we are considering more diversified and characteristic based benchmark. Other than performance measuring tools, our research also accounts for effect of fees on performance. Recently, Bello and Frank (2010) has given analysis regarding impact of reduced expense ratio (by Security and exchange commission's regulations) in US mutual funds performance. Their results show that both expense ratio and portfolio turnover are negatively related to investment performance. Hence, high expenses and high turnover tend to decrease performance (which is in line with previous studies). Empirical evidence has been supported by CAPM and Sharpe Information Ratios. Khorana, Servaes and Tufano (2005) explains fees are lower for larger funds and fund families, index funds, funds of funds, guaranteed funds, and funds that require a higher minimum investment. Geranio and Zanotti (2005) conducted research on Italian funds industry to develop a model for the factors affecting the level of expenses of mutual funds. The results presented were;

- Larger funds and funds belonging to larger families charge low costs to investors.
- Foreign domiciled funds have an edge over Italian ones by fiscal and regulatory burdens, which increase cost for investors.
- Institutional investors pay less cost.
- Equity funds and funds of funds charge comparatively higher costs than other type of funds.

Bessler, Drobetz and Zimmermann (2009) studied fund industry in german market while using beta-pricing approach and the stochastic discount factor (SDF). They drew a general conclusion that german mutual funds, on average, hardly produce returns that are large enough to cover their expenses.

Gil-Bazo and Ruiz-Verdú (2009) gave some surprising results on US based mutual funds that funds with worse before-fee performance charge higher fees. It supported the idea given many years ago by Gruber (1996) that high fees are associated with inferior rather than superior management. Unlike earlier studies, Gil-Bazo and Ruiz-Verdú (2009) focus on the relation between before fee performance and fees, and investigate whether differences in fees reflects differences in the value that mutual funds create for investors. Unexpectedly, they found a negative relationship between before-fee performance and fees in a sample of US equity mutual funds. They used the four factor model of Carhart and OLS method for analyzing relationship of fees with various types of portfolios. They estimated slope coefficients for the OLS regression of funds' monthly before-fee risk-adjusted performance on monthly fees. Returns were distributed in portfolios based on deciles, other fees, sub-periods and investment objectives (aggressive growth funds, growth midcap funds, growth and income funds, growth funds, and small company growth funds).

Our sample of french mutual funds has an exception from other European mutual funds, which has been noted earlier in Ottem and Bams (2002). As they concluded that European mutual funds (UK, Italy, Germany and Netherlands) seem to prefer smaller stocks, and stocks with high book-to-market ratios with exception to french mutual funds which prefer mid-caps portfolios. We are also following recent studies of Huji and Verbeek (2009) with an idea of style portfolios based on anomalies of Carhart (1997). They analyzed the impact of portfolios assembled on market beta, size beta, value beta and past returns of funds, which gives a better understanding of the factors affecting more on funds return. His results, obtained through Carhart's four factor model (1997) support the value premium and momentum effect for US funds.

Most of the literature and specifically new techniques are being used in US market. We want to explore European market and facilitate investors in this market. It will be helpful to study managers' preferences towards all the factors to get the some suitable portfolios. Our study will also confirm that whether the suitability of Carhart model and manager's style portfolio is also influential in other markets.

3. The Methodology and Model

Data regarding European mutual funds is obtained through Eurofidai for the period from June 1990 to December 2009. In European market, we studied five most important mutual funds countries; France, Germany, Italy, Netherlands and UK, as they cover more than two third of the total mutual funds in Europe (Ottem & Bam 2002).But because of data authenticity and availability, here we are analyzing only french domestic equity mutual funds. The initial sample contains 296 open end mutual funds of France from year 1990 to 2009. After selecting funds having market capitalization of more than 25000(€M), we are left with 289 funds. Third screening is done according to the strategy of funds, as we are only dealing with equity mutual funds. Thus, we removed money market, bond and income, and specialty mutual funds, including sector or regional funds. From rest of the sample, we selected funds that we can confidently describe as diversified domestic equity mutual funds (Ottem & Bam 2002; Gil-Bazo and Ruiz-Verdú 2009). To obtain our sample of purely domestic funds, we used information on funds' objectives mentioned in their

respective prospective. Consistency in terms of investment objective during our sample period is checked thoroughly. We are focusing to only domestically invested funds because it reduces the exposure to currency risk within the individual fund and fluctuation of fees in cross-border investments (Khorana, Servaes & Tufano 2005; 2009). However, our sampling can give us the disadvantage of home bias results as mentioned by Keswani and Stolin (2006). Apart from these screenings, the funds providing no data regarding management fee and net asset value has also been dropped down. If remaining sample contains some extreme values for expenses or returns, showing some errors are also eliminated. We didn't consider funds having historical values less than 5 years. Another common bias faced by mutual funds analysis is the gap created either between index and actively managed funds or between institutional and retail funds. As keeping in view the delicateness of our research area, we excluded passively managed (index) funds and institutional funds from our final sample. According to Baker, Haslem and Smith (2009) institutional investors have comparatively low exposure to fees (like front or deferred load, redemption fees or 12b-1 marketing expenses). Usually, they tend to trade securities less frequently which leads to get greater tax efficiency.

In order to test our hypothesis, we have conducted an empirical analysis on 122 funds domestically invested in France between 1990 and 2009.Our period of study is much larger than the earlier studies on European funds. The Carhart four-factor model (1997) is used which is the most widely used risk-adjusted performance metric for mutual fund returns.

$$R_{it} = \alpha_i + \beta_i(R_{mt} - R_{ft}) + \beta_{is}SMB_t + \beta_{ih}HML_t + \beta_{ip}PRIYR_t + \varepsilon_{it}$$

Here R_{it} is the portfolios **before expense return** rate of all equity mutual funds, R_{ft} is the risk-free return rate, and R_{mt} is the return of the whole stock market. The "three factor" beta is analogous to the classical beta but not equal to it, since there are now two additional factors to do some of the work. SMB and HML stand for "small [cap] minus big" and "high [book/price] minus low"; they measure the historic excess returns of small caps and "value" stocks over the market as a whole. PRIYR is one-year momentum in stock returns.We have created all the four benchmark factors taking in SBF250 index in accordance to Fama and French (1992), and Carhart(1997).

Before expense return rate is calculated while considering only management fee as it includes almost all the charges charged to investors' fund value. Other charges comprise the premiums in initial deposits or reduction in refund amounts in end. Therefore, the management fee given in percentage of Net asset value (NAV) has been added again to get before fee net asset value.

Funds will be arranged in quantile portfolios on the basis of betas of the respective factors of benchmark. According Fama and MacBeth (1973), by using an approach of distributing sample in portfolios reduces the "errors-in-variables" problem in the estimated factor exposure. Style portfolios will be formed like Huji and Verbeek (2009).

In order to find out the relationship between fund fees and before-fee risk adjusted performance, we first estimate by pooled ordinary least square (OLS) the regression equation;

$$\hat{\alpha}_{it} = \delta_{0t} + \delta_1 f_{it} + \xi_{it}, \qquad i = 1, \ldots..N, \qquad t = 1, \ldots...T$$

Where f_{it} is the fund's expense ratio and $\hat{\alpha}_{it}$ is its risk-adjusted before-fee performance measured according to Carhart's (1997) model for each fund. Style portfolios analysis and before fee performance relationship with management fee is new concept for European market.

4. The Findings

The table (I, II, III & IV) shows the performance estimation of portfolios made up of managers' stock picking styles with respect to Carhart's four anomalies i.e; market beta, size beta, value beta and one year past return. First portfolio shows highest beta values descending down to 10th portfolio. The results are shown in two periods because of the number of mutual funds functional in beginning of our research period were not enough to be divided among ten portfolios (Carhart 1997). Hence, in initial three years (1990-1993) the dependent variable has been regressed in five portfolios but later, onwards to 1993, we used 10 portfolios approach for funds' performance estimation. It must be noticed here that two period analyses will help us in comparing results with past studies, as most of literature review has included 1990 to 1993 data while introducing more relevant models. For resulting style portfolios, statistics presented in tables are: $\overline{\hat{\gamma}}_{\circ}$, the average of the month by month intercept estimate, $\overline{\hat{\gamma}}_{\mathrm{MKT}}$; the average of the month-by-month regression coefficient estimate of market premium (market excess return), $\overline{\hat{\gamma}}_{\mathrm{SMB}}$; the average of the month-by-month regression coefficient estimate of size factor constructed with the hierarchy of capitalization of benchmark firms,$\overline{\hat{\gamma}}_{\mathrm{HML}}$; the average of the month-by-month regression coefficient estimate of Value factor obtained with ranking of book to market ratio of benchmark enterprises, $\overline{\hat{\gamma}}_{\mathrm{MOM}}$; the average of the month-by-month regression coefficient estimate of one year past return. Further, s ($\hat{\gamma}_{\mathrm{j}}$) is the annualized standard deviation of the monthly estimates of all the four anomalies in model.

These standard deviations are calculated like; $s\left(\hat{\gamma}_{\mathrm{ij}}\right) = \sqrt{1/T * \sum\left(\gamma_{jt} - \bar{\gamma}_j\right)^2}$, where γ_{jt} is the each funds estimate in month t. Here, in table 3.3, we have annualized standard deviations by multiplying it by the square root of 12. Then, *t*-statistics for testing the hypothesis that, $\overline{\hat{\gamma}}_{\mathrm{j}} = 0$, are presented. These *t*-statistics are; $\mathrm{t}\,(\overline{\hat{\gamma}}_{\mathrm{j}}) = \frac{\overline{\hat{\gamma}}_{\circ}}{s(\hat{\gamma}_{\mathrm{j}})/\sqrt{\mathrm{n}}}$,where n is the number of months in the period, which is also the number of estimates $\hat{\gamma}_{\mathrm{jt}}$ used to compute $\overline{\hat{\gamma}}_{\mathrm{j}}$and $s(\hat{\gamma}_{\mathrm{j}})$. Finally, $\overline{R^2}$ and s(R^2), the mean and standard deviation of the month-to-month coefficients of determination, R^2.

- **Fama-Macbeth regressions:**

Series of tables (I, II, III & IV) presents our robust results to the number of portfolios. For all sorts, we observe the anomalies noted in other studies. **Table I** explains results of performance estimation model based on market premium (market excess return). It is earlier approach used by single factor capital asset pricing model for portfolios asset allocation in cross-sectional multi-regression techniques, well documented by Fama and Macbeth (1973). A first glance at the factor coefficients of second period reveals significant positive SMB loadings for small and large cap companies but small companies are significantly more skewed toward size factor (0.3518) at maximum confidence level. Book to market impact remains almost significantly same for value (0.3122) and growth stocks (0.3245) at 99% confidence level. Momentum and market anomalies remain negative for half of the portfolios; seem to add less explanatory power as compared to size and book to market influence. However, past returns shows significance for small firms. Coefficient of determination shows gradual increase from big cap and value portfolios (63%) to small cap and growth portfolios (78%) and therefore supporting the more predicting power in small capitalized firms. Results from earlier period 1990 to 1993 have significant results for mid cap companies while consistently showing strong coefficient of determination from big caps 66% to small caps 81%.

Table II shows the Carhart 4-factor regression results for size based funds portfolios, as have been proposed by Fama and French (1992). Overall results are favoring mid cap portfolio of mutual funds, showing significance for all the anomalies of size, book to market and past return at 99 percent confidence level, with exception to market portfolio. However exposure to size beta is significant at small cap as well. Coefficient of determination is also showing descending behavior (from 72% to 69%) with descending capitalization.

Moving towards **table III**, of portfolios based on value betas formed by ranking book to market ratio, reveals significant results for growth portfolios having lowest book to market ratios. The results are supported by high coefficient of determination (78%) as compared to high book to market ratios. All the variables are showing significance at 99% confidence level except size factor (which was quite expected if we remind the cross-section correlation (-0.26) between size and value anomalies). Higher coefficient of determination highlights this style of portfolios.

Finally, **table IV** presents the performance on past winner mutual funds. Jegadeesh-Titman (1993) and Carhart (1997)'s momentum factor seems to be comparatively less efficient for our sample of funds. On the same time, we can't ignore its high coefficient of determination figures which favours classical school of thoughts still supporting technical analysis approach. Although past losers seems to be well captured by our model, showing some significance towards market portfolio and momentum. However, US based studies of Carhart (1997) shows strong pattern in 4 factor model coefficients on portfolios of mutual funds sorted on one year return. Lets recall his two possible implications, firstly managers follow consistent strategies that determine their expected returns, whereas secondly managers choosing securities randomly but holding them for one to two years. In case of European market, we will favor second implication because our results are based on before-fee returns of funds.

Let's go through all the tables (I, II, III & IV) once again, while comparing portfolio performances with in each style on the basis of periods. We will confirm the results of Annaert and Campenhout (2007) about time variation in mutual fund style exposure. In table I, we find funds of big cap have higher exposure to market beta with 2.1346 at 95% significance level in first period of study but for 1993 onwards, this style is no more vigor to market factor. Same situation can be observed for a sort on past return supports second level (2^{nd} portfolio) of highest return in last 12 months for period before 1993 while showing significant results for three estimates but after 1993, we can no more find consistency of this style.

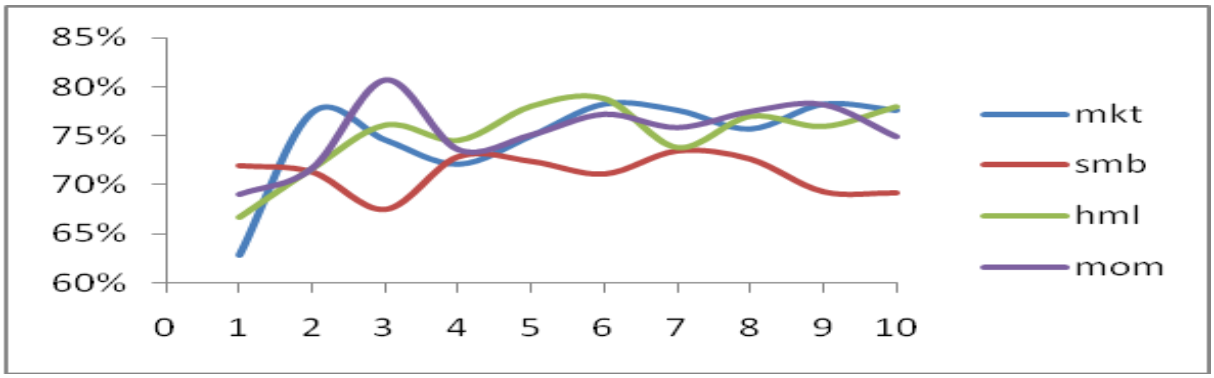
After overall anomalies analysis for all 40 portfolios from series of tables, we give more easy review through graphs figure I (a,b,c,d). For our 40 style portfolios, we compute average excess before-fee return and plot these values on the portfolio's market betas that we estimate by using Carhart 4-factor model. The line shows empirical relation between expected before-fee excess return and 4-factor coefficient estimates.

Portfolios based on market beta shows less volatile funds towards market movements are more related to momentum factor and therefore, we find an upward curve whereas coefficients of market and size shows decreasing behavior with decreasing vitality of funds towards market beta. Book to market seems to be unaffecting portfolio's return with decreasing market excess return of funds. However, coefficients show more stable behavior for portfolios made with descending size beta with an exception to market coefficient showing upward trend.

Portfolios based on value beta show inverse behavior to those of size beta with exception to lambda of past return, which seems to be unchanged. Lastly, portfolios based on relative 12 months prior return show a sharp downward curve for past losers towards coefficient market, with slight downward pattern for size as well.

On examining the R^2 values, we find that quality of the Carhart four-factor, to some extent, depends on the sort of portfolios. R^2 attains highest magnitude with a maximal value of 81percent for sort on past returns, more precisely for 3rd portfolio in descending past returns. Our excess return is before-fee, which points towards Gruber (1996), i.e; Persistent funds charge investors more than value added (fees)but still investors manage to earn capital gain by actively managing their portfolios. Lowest value for R^2 is indicated in portfolio having highest estimated exposure to market value, which supports the strong relation showed, in Carhart (1997) for small cap companies towards excess return.

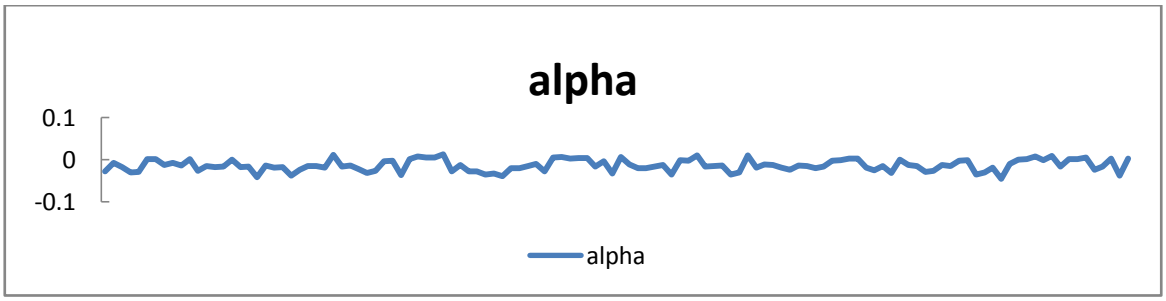
Figure I: Variations in R^2 on the function of constructed portfolios



By concluding our discussion, we must say that these results provide some understanding of the preferences of mutual funds managers as revealed by their portfolio holdings. Carhart (1997) and Gruber (1996) analyzed US fund preferences and reported that funds prefer smaller stocks and stocks with low book-to-market ratios. Our results about french mutual funds have an exception from other European mutual funds, which has been noted earlier in Ottem and Bams (2002). As they also concluded that European mutual funds (UK, Italy, Germany and Netherlands) seem to prefer smaller stocks, and stocks with high book-to-market ratios with exception to french mutual funds which prefer mid-caps portfolios.

Further, analysis has been taken to understand relation between performance and fees paid as worth of performance by investors. Figure III shows alpha values with respect to increasing fees values which doesn't follow any specific pattern.

Figure III: Coefficient of relationship between funds' performance and management fees charged.



According to table V, we can find that significantly negative relation exists between fund's before-fee performance and the fee they charge to investors. Analysis regarding high fees and low fees portfolio shows funds with high fee shows least coherence with alpha.

5. Summary and Conclusions

Our model with before fee excess return is unique contribution to European mutual fund studies and it has successfully explained some strategies more thoroughly and significantly than others. Mid cap portfolio sort on size can be better predicted with two anomalies of Fama- French three factor model (size and value premium) and also with Jegadeesh and Titman (1993)'s momentum anomaly.Small funds having

lower market excess returns can be confidently predicted with all the three anomalies of size, value and past returns. Portfolios comprised of small book to market ratio have significant exposure to market premium, value premium and past return. These funds also give sign for managerial skills with significant alpha. Our model doesn't show high level of predictability for past winners but it allows forecasting of some significant coefficients for past losers. Significantly negative relation exists between fund's before-fee performance and the fee they charge to investors, which is in accordance to findings of Gil-Bazo and Ruiz-Verdú (2009).Funds with high fee shows least coherence with alpha. Negative relation can be the consequence of some factors, which are omitted in univariate regression that can be related to fund's operating costs and eventually with fee as well.

These results indicate that measuring risk with use of the established pricing models is indeed problematic because it is suitable to some markets but not for all and more analytical and empirical work is needed to develop universally adapted risk factors. However, our results give a new dimension while deviating from most of US studies that argue mutual funds under-perform the market by the amount of expenses they charge. They provide better understanding of funds performance in European developing market. It enhances confidence of discouraged investors in European mutual funds.

For the current study, we do faced limitation of availability of time series data for management fee which hindered us in confirming persistent relationship between before fee performance and fee paid by investors. However, our study opens new horizons are future endeavors. One can analyze managerial preferences in style portfolios and impact of performance on management fee in other European markets like UK, Germany, and Italy etc. Instead of equity mutual funds, one must include other types of mutual funds to aid investors in funds selection.

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Appendix

Table I: Regression

We obtain our data on returns of mutual funds from the Database of Eurofidai. Our sample comprises 122 French equity funds over the period 1990-2009. We sort funds into 10 quantile portfolios based on the market beta, size beta, value beta, and past returns of their stock holdings. For the resulting style portfolios, we run Carhart 4FM regressions. Carhart 4FM parameter estimates, and R-squared values. All values are annualized.[2]

1990-1993(36 months) Sort on market premium beta																	
	$\bar{\hat{\gamma}}_{\circ}$	$\bar{\hat{\gamma}}_{MKT}$	$\bar{\hat{\gamma}}_{SMB}$	$\bar{\hat{\gamma}}_{HML}$	$\bar{\hat{\gamma}}_{MOM}$	$\overline{\widehat{\gamma_o - Rf}}$	$s(\hat{\gamma}_o)$	$s(\hat{\gamma}_{mkt})$	$s(\hat{\gamma}_{SMB})$	$s(\hat{\gamma}_{HML})$	$s(\hat{\gamma}_{MOM})$	$t(\bar{\hat{\gamma}}_{\circ})$	$t(\bar{\hat{\gamma}}_{MKT})$	$t(\bar{\hat{\gamma}}_{SMB})$	$t(\bar{\hat{\gamma}}_{HML})$	$t(\bar{\hat{\gamma}}_{MOM})$	$\overline{R^2}$	s(R²)
1	-0,0603	-0,1984	-0,0405	-0,0621	-0,0900	-0,5268	1,0383	1,1314	0,4848	0,8784	0,8449	-0,3486	-1,0520	-0,5015	-0,4242	-0,6391	0,6620	0,2752
2	-1,7447	2,1346**	0,1165	0,4624	0,9992	-2,2111	11,2749	5,4325	0,6128	3,2453	7,4223	-0,9284	2,3575	1,1410	0,8549	0,8077	0,7163	0,2365
3	0,2654	0,1830	-1,5675*	-2,0179	0,1830	-0,2010	9,1361	11,3382	4,9242	7,6968	4,0612	0,1743	0,0968	-1,9100	-1,5730	0,2704	0,7752	0,2206
4	0,0316	-0,2839	-0,6932*	-0,7382**	-0,3212	-0,4349	4,8340	5,3611	2,0902	1,7164	4,1341	0,0392	-0,3178	-1,9898	-2,5806	-0,4662	0,7447	0,2385
5	-0,2778	0,0389	0,0272	0,1880	0,0431	-0,7443	1,1230	1,0048	0,7756	0,9238	0,9077	-1,4843	0,2321	0,2101	1,2210	0,2849	0,8119	0,0529
1993-2009(138 months) Sort on market premium beta																	
	$\bar{\hat{\gamma}}_{\circ}$	$\bar{\hat{\gamma}}_{MKT}$	$\bar{\hat{\gamma}}_{SMB}$	$\bar{\hat{\gamma}}_{HML}$	$\bar{\hat{\gamma}}_{MOM}$	$\overline{\widehat{\gamma_o - Rf}}$	$s(\hat{\gamma}_o)$	$s(\hat{\gamma}_{mkt})$	$s(\hat{\gamma}_{SMB})$	$s(\hat{\gamma}_{HML})$	$s(\hat{\gamma}_{MOM})$	$t(\bar{\hat{\gamma}}_{\circ})$	$t(\bar{\hat{\gamma}}_{MKT})$	$t(\bar{\hat{\gamma}}_{SMB})$	$t(\bar{\hat{\gamma}}_{HML})$	$t(\bar{\hat{\gamma}}_{MOM})$	$\overline{R^2}$	s(R²)
1	-0,2152**	-0,4298*	0,1509	0,3122***	-0,2696	-0,5638	1,1421	2,8198	2,2175	1,0895	2,0383	-2,2133	-1,7907	0,7996	3,3663	-1,5536	0,6276	0,2381
2	-0,7019*	-0,1308	-0,0242	0,0486	0,0105	-1,0505	4,8537	6,0182	0,9785	3,0293	1,9078	-1,6988	-0,2553	-0,2908	0,1885	0,0649	0,7742	0,2508
3	-0,3106	0,5950	0,0716	0,2481	0,0108	-0,6593	3,3731	5,8282	1,3617	2,1577	1,5041	-1,0819	1,1992	0,6178	1,3510	0,0842	0,7457	0,1918
4	-0,3420	0,0594	0,0687*	0,4675***	-0,1589	-0,6906	3,8800	5,5196	0,4792	1,3988	2,7694	-1,0353	0,1264	1,6847	3,9259	-0,6742	0,7209	0,2316
5	0,2576	-1,3482*	-0,0051	0,0952	-0,2065	-0,0910	5,4224	9,0210	2,6367	2,5031	1,8186	0,5581	-1,7557	-0,0227	0,4469	-1,3342	0,7499	0,2349
6	-0,8523	0,1654	-0,0953	0,0635	-0,0816	-1,2009	6,9639	9,8238	2,7504	2,4546	1,8227	-1,4377	0,1978	-0,4072	0,3040	-0,5260	0,7827	0,2150
7	0,4132	0,0860	0,2503*	1,1674**	0,3116	0,0646	7,7514	8,9015	1,5968	6,7886	3,1007	0,6262	0,1134	1,8416	2,0201	1,1804	0,7762	0,2310
8	-0,1425	-0,0564	0,0962	-0,1155	-0,0867	-0,4911	4,3634	4,1833	1,5592	2,1291	3,8449	-0,3837	-0,1584	0,7249	-0,6373	-0,2649	0,7571	0,2750
9	-1,4242***	0,9621**	0,0143	0,1477	-0,3411**	-1,7728	4,9386	5,6400	0,7474	1,3210	2,0492	-3,3878	2,0039	0,2253	1,3138	-1,9552	0,7825	0,2389
10	-0,2892	-0,3711	0,3518***	0,3245***	-0,2938***	-0,6378	3,1465	3,5959	0,8695	0,9884	1,2834	-1,0796	-1,2123	4,7536	3,8572	-2,6890	0,7762	0,2411

***Significance at 1% level; ** 5% level;* 10% level.

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Table II: Regression (Continued)

We obtain our data on returns of mutual funds from the Database of Eurofidai. Our sample comprises 122 French equity funds over the period 1990-2009. We sort funds into 10 quantile portfolios based on the market beta, size beta, value beta, and past returns of their stock holdings. For the resulting style portfolios, we run Carhart 4FM regressions. Carhart 4FM parameter estimates, and R-squared values. All are annualized.[3]

1990-1993(36 months) Sort on Size beta																		
	$\bar{\hat{\gamma}}_{\circ}$	$\bar{\hat{\gamma}}_{MKT}$	$\bar{\hat{\gamma}}_{SMB}$	$\bar{\hat{\gamma}}_{HML}$	$\bar{\hat{\gamma}}_{MOM}$	$\overline{\hat{\gamma}_o - Rf}$	$s(\hat{\gamma}_o)$	$s(\hat{\gamma}_{mkt})$	$s(\hat{\gamma}_{SMB})$	$s(\hat{\gamma}_{HML})$	$s(\hat{\gamma}_{MOM})$	$t(\bar{\hat{\gamma}}_{\circ})$	$t(\bar{\hat{\gamma}}_{MKT})$	$t(\bar{\hat{\gamma}}_{SMB})$	$t(\bar{\hat{\gamma}}_{HML})$	$t(\bar{\hat{\gamma}}_{MOM})$	$\overline{R^2}$	$s(R^2)$
1	-1,4264	-1,1884	-0,2245	-1,0278	0,0392	-1,8928	11,4308	4,3824	6,4010	7,8457	5,4261	-0,7487	-1,6271	-0,2104	-0,7860	0,0433	0,7622	0,2341
2	-1,5109	0,7549	-0,1460	0,0691	0,4993	-1,9773	10,4467	9,3568	2,5266	2,4603	5,2993	-0,8678	0,4841	-0,3466	0,1685	0,5653	0,7601	0,2504
3	0,1175	-0,5984	0,6077	-1,9905***	0,5722	-0,3490	2,8480	2,1727	5,6713	2,8167	4,1142	0,2476	-1,6525	0,6430	-4,2400	0,8344	0,6426	0,2551
4	-0,3863**	-0,0196	1,0510	-0,4521	0,2302	-0,8528	1,1541	1,3261	6,4042	3,5144	1,5585	-2,0284	-0,0886	0,9847	-0,7719	0,8864	0,7114	0,2049
5	0,0898	0,2890	-0,1826	-2,7741***	-9,2528***	-0,3766	1,3878	2,4801	1,1978	0,9560	1,8087	0,3884	0,6991	-0,9144	-17,4110	-30,6939	0,6815	0,2220
1993-2009(138 months)) Sort on Size beta																		
	$\bar{\hat{\gamma}}_{\circ}$	$\bar{\hat{\gamma}}_{MKT}$	$\bar{\hat{\gamma}}_{SMB}$	$\bar{\hat{\gamma}}_{HML}$	$\bar{\hat{\gamma}}_{MOM}$	$\overline{\hat{\gamma}_o - Rf}$	$s(\hat{\gamma}_o)$	$s(\hat{\gamma}_{mkt})$	$s(\hat{\gamma}_{SMB})$	$s(\hat{\gamma}_{HML})$	$s(\hat{\gamma}_{MOM})$	$t(\bar{\hat{\gamma}}_{\circ})$	$t(\bar{\hat{\gamma}}_{MKT})$	$t(\bar{\hat{\gamma}}_{SMB})$	$t(\bar{\hat{\gamma}}_{HML})$	$t(\bar{\hat{\gamma}}_{MOM})$	$\overline{R^2}$	$s(R^2)$
1	-0,3835**	-0,0265	0,1327	0,0642	0,0838	-0,7321	1,9442	1,7048	1,6297	1,3106	1,2706	-2,3174	-0,1829	0,9566	0,5755	0,7751	0,7195	0,0591
2	-0,2996***	0,1403	-0,1979	-0,1204	-0,3358	-0,6482	0,9446	1,3346	3,9268	1,3573	2,7958	-3,7261	1,2353	-0,5920	-1,0418	-1,4111	0,7129	0,0579
3	-0,2641	0,0825	-0,1775	-0,3120	-0,0704	-0,6128	4,4415	2,4413	4,1803	2,4606	2,8218	-0,6986	0,3968	-0,4989	-1,4895	-0,2931	0,6754	0,2477
4	-0,5751	0,3168***	-0,2758*	0,0432	-0,2282***	-0,9237	4,8315	0,4241	1,8282	0,3140	0,6533	-1,3982	8,7760	-1,7725	1,6153	-4,1044	0,7286	0,0585
5	-0,4134	-0,1957	0,7553***	-0,1968***	-0,3263***	-0,7620	5,6347	2,7687	2,3627	0,5310	0,5829	-0,8619	-0,8304	3,7554	-4,3548	-6,5768	0,7238	0,2360
6	-0,0191	-0,0714	-0,3027	0,2472	-0,1429	-0,3677	4,3889	2,3485	3,7969	2,4708	1,8273	-0,0511	-0,3574	-0,9367	1,1755	-0,9186	0,7110	0,2623
7	-0,5711	-0,3509	0,1692	0,2037	0,1748	-0,9197	3,8792	3,0585	3,3487	1,5018	2,4825	-1,7294	-1,3476	0,5934	1,5931	0,8271	0,7342	0,2283
8	-0,6571*	-0,4911	1,4934***	0,4139**	0,1715	-1,0057	4,6363	4,2868	2,8529	2,1413	3,7593	-1,6650	-1,3457	6,1496	2,2709	0,5359	0,7261	0,2444
9	-0,1883	-0,1585	0,1662	-0,1667	0,1142	-0,5369	5,1130	2,8852	2,4195	3,0590	1,6583	-0,4326	-0,6454	0,8071	-0,6402	0,8088	0,6932	0,0559
10	-0,2722**	0,0409	0,1268***	0,0012	0,0432	-0,6209	1,4535	2,0223	0,5204	0,9079	1,4200	-2,2002	0,2374	2,8631	0,0158	0,3574	0,6921	0,2513

***Significance at 1% level; ** 5% level;* 10% level.

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Table III:Regression (continued)

We obtain our data on returns of mutual funds from the Database of Eurofidai. Our sample comprises 122 French equity funds over the period 1990-2009. We sort funds into 10 quantile portfolios based on the market beta, size beta, value beta, and past returns of their stock holdings. For the resulting style portfolios, we run Carhart 4FM regressions. Carhart 4FM parameter estimates, and R-squared values. All estimates are annualized.[4]

1990-1993(36 months) Sort on Value Beta																		
	$\overline{\hat{\gamma}}_{\circ}$	$\overline{\hat{\gamma}}_{MKT}$	$\overline{\hat{\gamma}}_{SMB}$	$\overline{\hat{\gamma}}_{HML}$	$\overline{\hat{\gamma}}_{MOM}$	$\overline{\widehat{\gamma_o - Rf}}$	$s(\hat{\gamma}_o)$	$s(\hat{\gamma}_{mkt})$	$s(\hat{\gamma}_{SMB})$	$s(\hat{\gamma}_{HML})$	$s(\hat{\gamma}_{MOM})$	$t(\overline{\hat{\gamma}}_{\circ})$	$t(\overline{\hat{\gamma}}_{MKT})$	$t(\overline{\hat{\gamma}}_{SMB})$	$t(\overline{\hat{\gamma}}_{HML})$	$t(\overline{\hat{\gamma}}_{MOM})$	$\overline{R^2}$	s(R²)
1	-0,2659**	-0,0171	-0,1685	-0,0891	0,0041	-0,7324	0,6407	0,7244	0,8791	0,8490	0,9013	-2,4901	-0,1419	-1,1497	-0,6295	0,0274	0,6737	0,2260
2	-0,3556*	0,1816	0,0625	0,1362	-0,1410	-0,8221	1,0861	1,3558	0,5077	3,0280	1,7091	-1,9645	0,8038	0,7384	0,2699	-0,4948	0,7068	0,2114
3	-0,2602	-0,3792	-0,3884	2,4027**	-0,5300	-0,7266	0,9895	1,5656	2,4102	7,5447	3,8156	-1,5777	-1,4533	-0,9669	1,9708	-0,8334	0,8291	0,1897
4	0,3076	0,1422	0,5183**	0,0364	-0,7248	-0,1588	2,3330	2,4442	1,3334	4,9750	2,6916	0,7911	0,3489	2,3325	0,0439	-1,6157	0,6490	0,3075
5	-0,3107	-0,5053	0,1123	0,9909	-0,0257	-0,7772	3,7632	3,9333	3,9605	5,2033	3,2349	-0,4954	-0,7707	0,1702	1,1426	-0,0477	0,7996	0,2612
1993-2009(138 months) Sort on Value Beta																		
	$\overline{\hat{\gamma}}_{\circ}$	$\overline{\hat{\gamma}}_{MKT}$	$\overline{\hat{\gamma}}_{SMB}$	$\overline{\hat{\gamma}}_{HML}$	$\overline{\hat{\gamma}}_{MOM}$	$\overline{\widehat{\gamma_o - Rf}}$	$s(\hat{\gamma}_o)$	$s(\hat{\gamma}_{mkt})$	$s(\hat{\gamma}_{SMB})$	$s(\hat{\gamma}_{HML})$	$s(\hat{\gamma}_{MOM})$	$t(\overline{\hat{\gamma}}_{\circ})$	$t(\overline{\hat{\gamma}}_{MKT})$	$t(\overline{\hat{\gamma}}_{SMB})$	$t(\overline{\hat{\gamma}}_{HML})$	$t(\overline{\hat{\gamma}}_{MOM})$	$\overline{R^2}$	s(R²)
1	-0,6752**	0,2029	-0,0249	-0,0759	0,0053	-1,0238	3,7941	2,5990	0,5562	0,9994	1,1171	-2,0905	0,9172	-0,5255	-0,8916	0,0555	0,6672	0,2417
2	0,0272	0,2550	-0,0963	0,5965*	0,2592	-0,3214	3,8822	2,1635	1,5008	4,1436	2,5759	0,0823	1,3845	-0,7541	1,6912	1,1822	0,7172	0,2361
3	-0,5046	-0,2537	0,3317	0,6094	0,2722	-0,8533	4,3601	3,1576	2,7964	4,9548	3,3445	-1,3597	-0,9438	1,3933	1,4448	0,9559	0,7614	0,2309
4	-0,8889**	0,0603	0,2281	0,5539	0,1053	-1,2375	4,7599	2,9106	1,8460	5,9110	2,2362	-2,1937	0,2433	1,4513	1,1009	0,5534	0,7457	0,2507
5	0,6834	0,4475***	0,1532**	0,7826	-0,2508	0,3348	5,6213	0,4397	0,9153	6,0608	2,3512	1,4283	11,9557	1,9657	1,5169	-1,2530	0,7806	0,2372
6	-0,6083	-0,0274	0,1986	0,3170	0,1318	-0,9569	5,8713	3,2279	2,8036	5,8699	2,5624	-1,2171	-0,0996	0,8323	0,6344	0,6042	0,7884	0,2311
7	0,6207	0,0433	-0,1474	1,1061**	-0,0197	0,2721	5,7095	3,5059	1,9864	6,2414	2,1743	1,2771	0,1450	-0,8717	2,0818	-0,1063	0,7385	0,2432
8	-0,1685	-0,0724	-0,1130	0,1154	0,3383	-0,5171	2,9532	2,8768	2,7246	5,5821	3,8683	-0,6703	-0,2956	-0,4870	0,2428	1,0275	0,7703	0,2377
9	-0,5983*	-0,0342	-0,1980	0,1833	0,2270	-0,9469	4,0833	2,0023	2,1152	3,7041	1,8881	-1,7212	-0,2008	-1,0994	0,5815	1,4124	0,7599	0,2335
10	-0,4995***	-0,5981***	-0,0039	0,1119***	-0,1218***	-0,8481	2,2107	5,3357	1,6506	1,5038	2,2048	-14,4072	-2,9617	-0,1999	6,9731	-3,5324	0,7801	0,2432

[4]***Significance at 1% level; ** 5% level;* 10% level.

Table IV: Regression (continued)

We obtain our data on returns of mutual funds from the Database of Eurofidai. Our sample comprises 122 French equity funds over the period 1990-2009. We sort funds into 10 quantile portfolios based on the market beta, size beta, value beta, and past returns of their stock holdings. For the resulting style portfolios, we run Carhart 4FM regressions. Carhart 4FM parameter estimates, and R-squared values. All estimates are annualized.[5]

1990-1993(36 months) Sort on Past Return																		
	$\overline{\hat{\gamma}}_{\circ}$	$\overline{\hat{\gamma}}_{MKT}$	$\overline{\hat{\gamma}}_{SMB}$	$\overline{\hat{\gamma}}_{HML}$	$\overline{\hat{\gamma}}_{MOM}$	$\overline{\hat{\gamma}_o - Rf}$	$s(\hat{\gamma}_o)$	$s(\hat{\gamma}_{mkt})$	$s(\hat{\gamma}_{SMB})$	$s(\hat{\gamma}_{HML})$	$s(\hat{\gamma}_{MOM})$	$t(\overline{\hat{\gamma}}_{\circ})$	$t(\overline{\hat{\gamma}}_{MKT})$	$t(\overline{\hat{\gamma}}_{SMB})$	$t(\overline{\hat{\gamma}}_{HML})$	$t(\overline{\hat{\gamma}}_{MOM})$	$\overline{R^2}$	s(R²)
1	-0,2781	-0,2062	-0,2522	-0,2284	-0,0018	-0,7446	1,5366	2,8526	1,3875	2,4996	1,1385	-1,0860	-0,4338	-1,0906	-0,5483	-0,0097	0,6167	0,2692
2	-1,0171**	0,8128**	0,2228	1,2493***	-1,0749	-1,4836	2,2964	2,4342	1,1076	1,8373	4,4495	-2,6574	2,0350	1,2072	4,0796	-1,4494	0,7539	0,2398
3	-0,3388	0,2470	0,0191	1,0879**	-1,3713	-0,8053	2,4700	2,4897	0,8933	3,2555	6,1855	-0,8230	0,5952	0,1284	2,0501	-1,3302	0,8141	0,1982
4	-0,4914**	0,2453	-0,0078	-0,0034	-0,5544	-0,9579	1,2283	1,0726	0,9845	1,3284	7,7849	-2,4304	1,3719	-0,0475	-0,0152	-0,4273	0,7284	0,2523
5	-0,1996	-0,0514	-0,2202	-0,2590	0,0846	-0,6660	2,7784	2,5791	1,5220	2,7291	6,2258	-0,4309	-0,1195	-0,8679	-0,5694	0,0816	0,7280	0,2315
1993-2009(138 months) Sort on Past Return																		
	$\overline{\hat{\gamma}}_{\circ}$	$\overline{\hat{\gamma}}_{MKT}$	$\overline{\hat{\gamma}}_{SMB}$	$\overline{\hat{\gamma}}_{HML}$	$\overline{\hat{\gamma}}_{MOM}$	$\overline{\hat{\gamma}_o - Rf}$	$s(\hat{\gamma}_o)$	$s(\hat{\gamma}_{mkt})$	$s(\hat{\gamma}_{SMB})$	$s(\hat{\gamma}_{HML})$	$s(\hat{\gamma}_{MOM})$	$t(\overline{\hat{\gamma}}_{\circ})$	$t(\overline{\hat{\gamma}}_{MKT})$	$t(\overline{\hat{\gamma}}_{SMB})$	$t(\overline{\hat{\gamma}}_{HML})$	$t(\overline{\hat{\gamma}}_{MOM})$	$\overline{R^2}$	s(R²)
1	-0,5323**	0,0220	-0,0327	-0,0238	0,0323	-0,8809	2,5111	0,9816	0,3112	0,7099	1,0938	-2,4903	0,2636	-1,2348	-0,3943	0,3474	0,6902	0,2366
2	-0,3323	-0,1291	-0,0756	-0,0287	0,0590	-0,6809	5,5047	2,8764	1,0975	2,0040	5,3550	-0,7092	-0,5272	-0,8096	-0,1683	0,1294	0,7171	0,2471
3	-1,0515**	0,1345	0,0839	-0,1797	-0,7943	-1,4001	5,5082	2,4225	0,9900	1,6497	6,8152	-2,2425	0,6524	0,9954	-1,2798	-1,3691	0,8074	0,2000
4	-0,5652	0,0417	-0,3004	0,0032	-0,1332	-0,9138	5,8278	3,3605	2,4021	1,3245	6,5994	-1,1393	0,1459	-1,4693	0,0285	-0,2371	0,7360	0,2169
5	-0,5820*	0,2029	0,0826	0,1149	0,6503	-0,9306	5,1979	1,4939	0,6675	1,4202	7,8898	-1,3153	1,5955	1,4533	0,9502	0,9683	0,7511	0,2161
6	0,1171	0,0545	0,4137**	-0,0291	0,2971	-0,2315	5,9530	4,6428	2,4297	3,6064	7,9234	0,2311	0,1378	2,0005	-0,0949	0,4406	0,7722	0,2440
7	0,3913	0,1397	-0,1123	0,2383	0,1731	0,0427	5,7281	2,3343	1,2229	2,9288	9,2540	0,8026	0,7032	-1,0785	0,9560	0,2197	0,7586	0,2465
8	-1,3814***	0,4319**	0,1607	-0,4490***	-0,5604	-1,7300	5,1950	2,5132	1,3005	1,9671	5,5562	-3,1237	2,0188	1,4512	-2,6817	-1,1849	0,7750	0,2481
9	-0,5824***	0,0337	-0,0011	0,0747	-0,1589	-0,9310	2,4973	1,7877	0,7510	0,9334	3,3353	-2,7397	0,2217	-0,0179	0,9397	-0,5596	0,7822	0,2276
10	-0,1734	0,3911**	-0,0778	0,0011	-0,3774**	-0,5220	1,7165	2,2542	0,6904	0,7193	1,9377	-1,1868	2,0381	-1,3230	0,0179	-2,2882	0,7492	0,2361

[5] ***Significance at 1% level; ** 5% level;* 10% level.

Figure IA: Mutual funds' average excess returns and lambdas' of Carhart's Anomalies
Panel A. Sort on Market beta

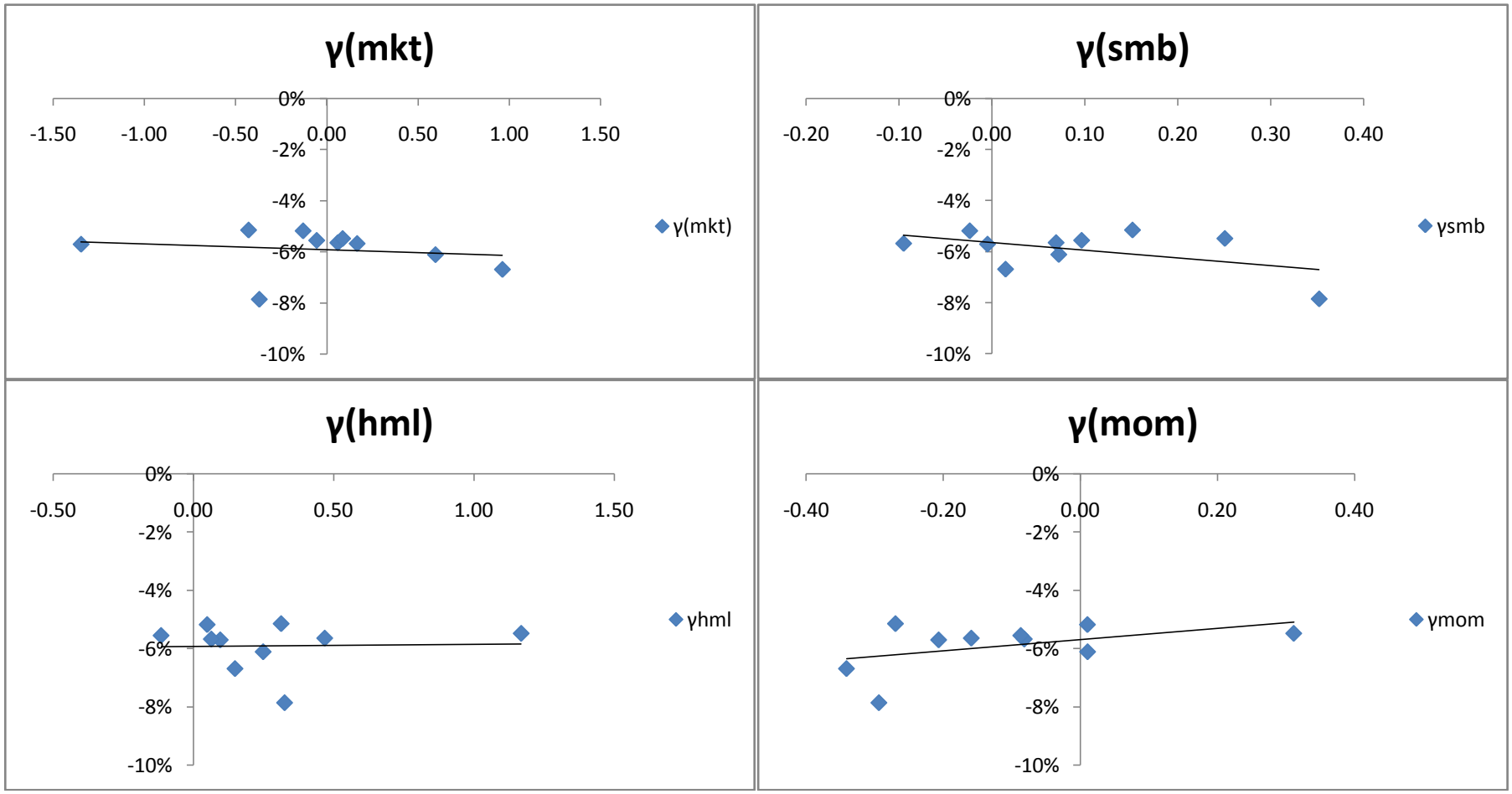

Figure IB: Mutual Funds' Average Excess Returns and Lambdas' of Carhart's Anomalies
Panel A. Sort on Size Beta

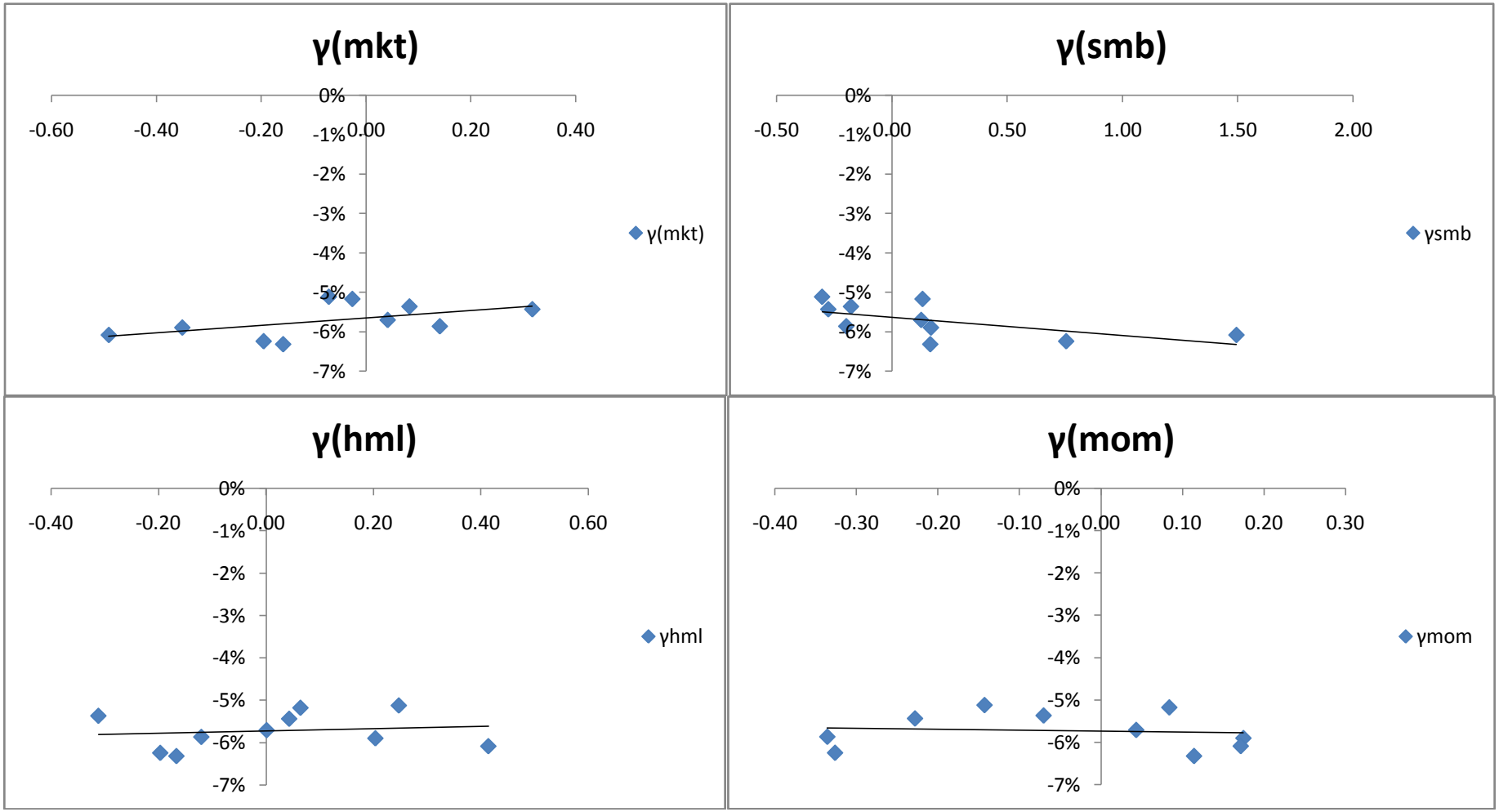

Figure IC: Mutual funds' average excess returns and lambdas' of Carhart's Anomalies
Panel A. Sort on Value beta

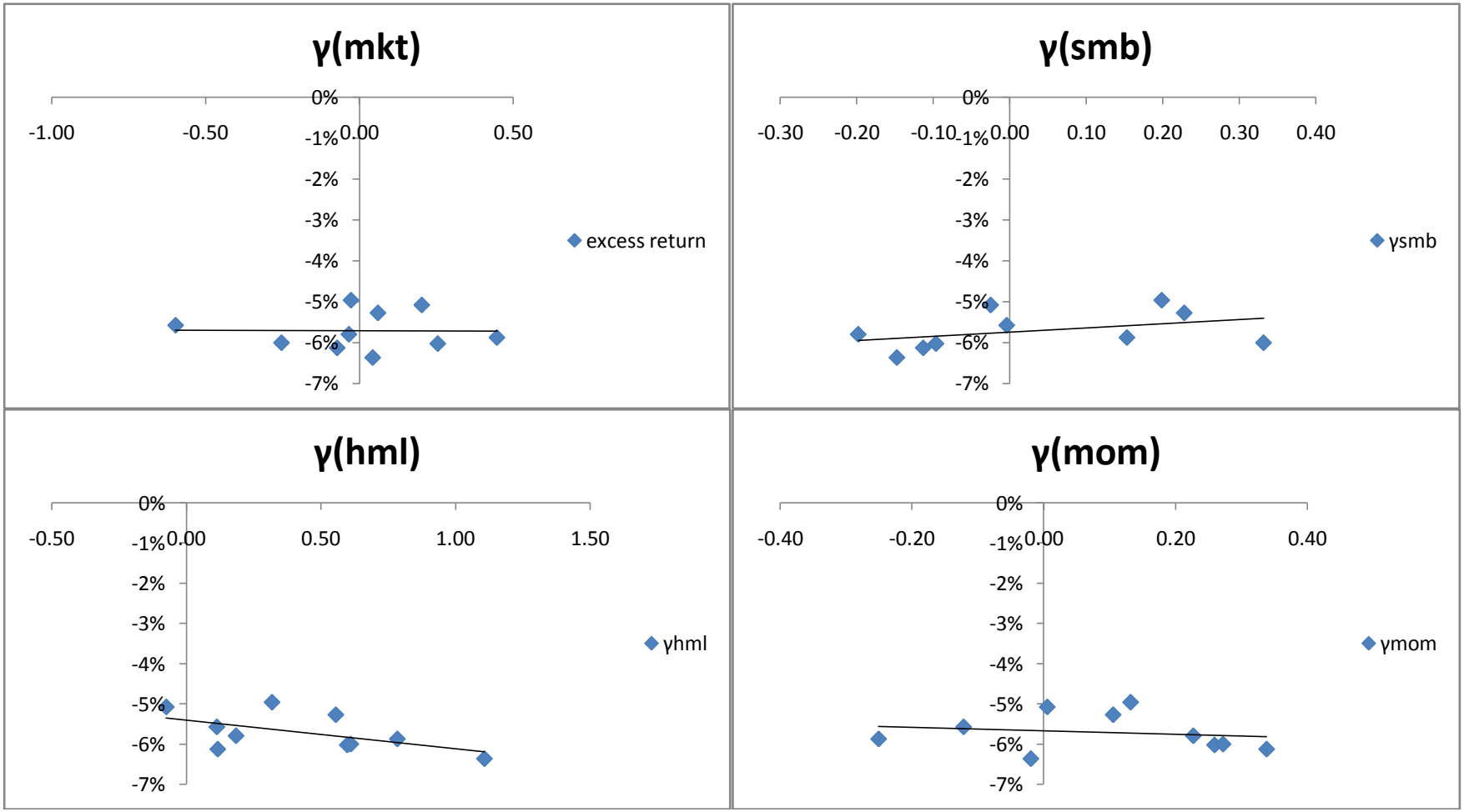

Figure ID: Mutual Funds' Average Excess Returns and Lambdas' of Carhart's Anomalies
Panel A. Sort on Past Return

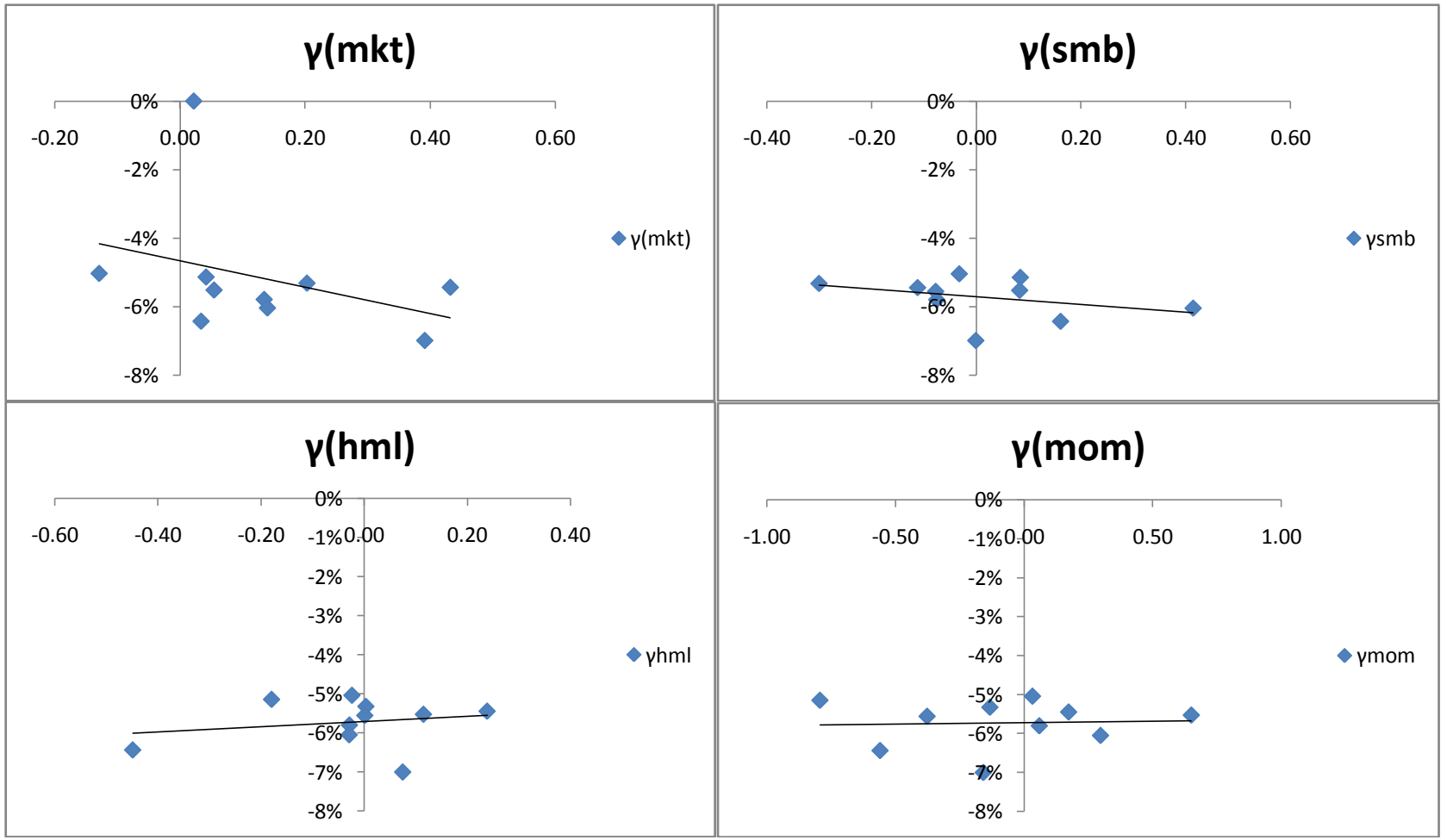

Table V: Relationship of Performance and Fee.

	R^2	Adj. R^2	Coefficient	Standard error	t value	Significance
low expenses	46,17	45,27	-0,01101	0,00154	-7,17	<0,0001
high expenses	45,96	45,06	-0,00565	0,00079	-7,14	<0,0001
overall effect	41,51	41,02	-0,00697	0,00075	-9,27	<0,0001