

# WHO BENEFITS FROM FUNDS OF HEDGE FUNDS? A CRITIQUE OF ALTERNATIVE ORGANIZATIONAL STRUCTURES IN THE HEDGE FUND INDUSTRY (II)

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## **Abstract**

This paper provides a critique of alternative organizational structures in the hedge fund industry. Our critique is facilitated by several stylized models describing alternative industry structures. The models include: (1) An inside-only hedge fund model; (2) A straddling hedge fund model; (3) A straddling “feeder” fund of funds (FOF) hedge fund model; (4) A stand-alone outside hedge fund; and (5) An outside “feeder” FOF hedge fund model. Our discussion of these models, which centers on benefits vs. fundamental problems related to illiquidity, information asymmetry, and conflicts of interest, leads to several hypotheses about the differential characteristics and return performance of both individual hedge funds and FOFs. We test as many of these hypotheses as data availability allows, and evidence is consistent with these hypotheses. Regarding characteristics, we predict that some hedge funds and FOFs will have greater leverage and/or more restrictive withdrawal policies than others, and evidence is consistent with these predictions. Regarding return performance, we predict that certain hedge funds, and FOFs in general, will have relatively poor return performance, and evidence is consistent.

**Keywords:** Hedge funds, Funds of funds, Illiquidity, Information asymmetry, Conflicts of interest, Adjacency risk, Contagion, Return performance.

## **1. DATA AND PRELIMINARY EVIDENCE**

In this section, we first detail our data sources and then provide evidence on the importance of the funds of hedge funds in the hedge fund industry.

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### 1.1. Data sources

For funds performance and characteristics, we obtain data from Lipper TASS (henceforth TASS). Our data spans the period from January 1994 to December 2008, but since funds may report late (Titman and Tiu (2010)), we use records as of April 2009. The TASS database has been used extensively by hedge funds researchers with some (e.g. Liang (1999)) suggesting that it should be the preferred database for academic research. There are a total of 12,678 funds reporting in the TASS database, of which 6,749 are still in existence. Of all the funds reporting, roughly a third (3,689) are funds of hedge funds.

Table 1 presents summary statistics of the funds in the TASS database. The AUM tracked by TASS exploded from a little over \$50 billion in 1994 to over \$1.7 trillion in 2006, to decrease to around \$1 trillion until December 2008 as the industry traversed the world financial crisis. These are funds other than funds of hedge funds. We assume that including the funds of hedge funds in the total AUM means double counting. While TASS provides data on a variety of fund characteristics, such as leverage or style, it does not track whether stand-alone funds have a fund of hedge funds among their investors. Funds of hedge funds, in turn, do not disclose their portfolios.

TABLE 1 – SUMMARY STATISTICS FOR HEDGE FUNDS AND FUNDS OF HEDGE FUNDS

Year		Returns						M.Fee		L.Fee		AUM(million)					Total	
		Mean	Std	min	p25	Median	p75	max	Mean	Std	Mean	Std	Mean	Std	p25	Median		p75
1994	All funds (929)	0.04	5.28	-69.81	-2.10	0.15	1.93	61.11	1.56	1.16	15.51	8.96	66.92	256.07	8.10	12.72	40.92	55,814
	Funds of funds (225)	-0.87	9.12	-22.08	-1.79	-0.21	0.95	20.42	1.74	0.96	9.40	9.11	72.77	244.21	4.50	15.58	49.65	14,878
1995	All funds (1,154)	1.41	6.40	-89.97	-0.64	1.07	2.94	298.12	1.56	1.05	16.87	7.78	59.02	237.75	2.96	12.05	38.77	68,710
	Funds of funds (299)	0.85	3.02	-17.91	-0.40	0.85	2.01	28.90	1.70	0.90	9.50	8.76	67.16	222.98	3.84	11.80	41.90	20,678
1996	All funds (1,424)	1.49	6.00	-94.09	-0.38	1.21	3.23	289.42	1.50	0.94	16.89	7.40	64.35	264.00	3.84	12.51	44.16	99,064
	Funds of funds (349)	1.11	3.46	-27.30	-0.04	1.08	2.84	89.35	1.66	0.85	9.20	8.59	76.50	257.42	4.00	12.26	44.71	27,891
1997	All funds (1,656)	1.49	6.15	-88.68	-0.65	1.16	3.59	99.70	1.44	0.85	17.21	7.18	80.58	320.74	4.34	16.50	54.60	140,998
	Funds of funds (403)	1.10	4.80	-89.90	-0.38	1.01	2.64	71.87	1.61	0.77	8.88	8.27	94.28	308.27	4.25	14.77	53.29	39,414
1998	All funds (1,914)	0.42	8.04	-91.90	-1.70	0.77	3.13	245.80	1.41	0.82	17.47	6.98	91.58	421.90	4.77	18.96	60.07	153,481
	Funds of funds (462)	0.12	4.72	-48.98	-1.25	0.42	1.80	48.48	1.56	0.71	7.67	7.78	106.88	341.01	4.06	16.10	63.58	46,588
1999	All funds (2,205)	2.15	7.18	-83.10	-0.60	1.15	3.81	187.45	1.89	0.77	17.55	6.74	94.31	488.98	4.68	18.24	59.02	230,888
	Funds of funds (527)	1.66	4.26	-84.78	0.12	1.09	2.58	66.90	1.53	0.67	7.78	7.54	102.09	329.79	3.90	16.86	61.24	56,849
2000	All funds (2,487)	0.82	7.44	-84.26	-1.65	0.77	2.90	97.61	1.88	0.72	17.67	6.57	118.68	607.69	5.29	21.48	73.99	310,907
	Funds of funds (646)	0.67	3.93	-78.40	-0.59	0.65	1.84	84.40	1.49	0.62	7.61	7.14	117.09	385.59	4.14	20.00	70.01	76,155
2001	All funds (2,856)	0.57	5.57	-88.31	-1.02	0.60	2.17	122.46	1.88	0.67	17.78	6.48	152.81	1,176.26	5.88	22.89	78.48	480,827
	Funds of funds (897)	0.41	2.64	-31.43	-0.20	0.47	1.12	86.59	1.46	0.61	7.57	6.89	127.70	476.96	4.20	20.58	82.49	116,288
2002	All funds (3,811)	0.28	4.46	-84.00	-1.14	0.35	1.68	167.41	1.60	0.64	17.63	6.52	158.46	1,854.52	4.74	23.00	83.00	480,738
	Funds of funds (1,191)	0.21	2.06	-83.29	-0.86	0.30	0.84	59.57	1.43	0.61	7.49	6.84	138.09	521.59	3.80	22.00	92.41	167,616
2003	All funds (3,848)	1.40	3.98	-89.79	-0.09	0.88	2.85	151.74	1.43	0.62	17.42	6.64	168.54	1,898.14	4.24	23.69	88.05	744,881
	Funds of funds (1,569)	0.90	2.09	-84.83	0.19	0.76	1.44	54.93	1.43	0.60	7.55	6.94	148.26	668.69	1.05	22.00	92.79	244,127
2004	All funds (4,515)	0.71	3.21	-47.69	-0.44	0.54	1.71	55.76	1.46	0.62	17.21	6.78	246.41	2,170.56	3.70	26.25	103.99	1,199,484
	Funds of funds (2,067)	0.54	1.67	-27.57	-0.17	0.45	1.26	41.22	1.43	0.58	7.62	6.95	185.51	1,226.36	1.24	23.66	100.07	410,715
2005	All funds (5,190)	0.83	3.41	-80.00	-0.48	0.70	2.00	73.81	1.49	0.64	16.98	6.99	315.50	3,220.48	2.70	25.90	110.70	1,700,660
	Funds of funds (2,428)	0.60	1.85	-17.59	-0.30	0.73	1.52	64.71	1.43	0.57	7.50	6.87	260.88	1,481.86	1.22	24.58	104.29	498,479
2006	All funds (5,659)	0.97	3.64	-98.89	-0.27	0.88	2.10	272.86	1.51	0.65	16.44	7.40	352.70	2,812.85	2.08	25.87	114.11	1,719,309
	Funds of funds (2,688)	0.71	1.94	-88.26	-0.09	0.77	1.61	48.52	1.42	0.58	7.44	6.92	197.05	1,299.72	0.91	25.13	104.68	499,107
2007	All funds (5,820)	0.85	3.91	-89.38	-0.54	0.78	2.18	187.67	1.52	0.64	15.85	7.70	340.92	2,885.07	1.18	26.25	110.44	1,710,819
	Funds of funds (2,936)	0.65	2.87	-100.00	-0.14	0.80	1.69	80.45	1.43	0.62	7.83	6.95	193.79	1,104.01	0.43	24.80	107.00	550,507
2008	All funds (5,874)	-1.48	7.09	-100.00	-8.37	-0.39	1.90	468.58	1.52	0.64	15.23	8.01	312.22	3,211.26	0.49	21.25	102.60	1,046,094
	Funds of funds (3,017)	-1.66	3.97	-74.61	-3.01	-1.06	0.58	68.78	1.44	0.72	7.13	7.68	181.07	1,020.54	0.88	21.49	95.00	360,649

In order to obtain information on whether a fund has a FOF among its investors, we collect data from Morningstar. In addition to tracking hedge funds, the Morningstar database reports a specific variable that is equal to one if a stand-alone hedge fund had at least one FOF among its investors. The Morningstar database has been previously used by de Roon, Guo, and ter Horst (2010) to argue that the stand-alone funds having funds of hedge funds investors are not selected randomly from all the

funds available. The Morningstar database tracks 6,976 funds as of December 2008; unfortunately, statistics such as leverage, or data such as the day a fund joins a database are not reported in Morningstar and thus we needed to merge the two databases. We performed the merger using fund names. Such matching procedures are used in the hedge funds literature, for example recently by Agarwal, Jiang, and Fos (2010). In the merger, we identify a total of 7,283 common funds. Of these, 2,085 have at least one FOF investor, while the remainder of 5,198 have never been associated with a FOF.

**1.2. How important are funds of hedge funds?**

We continue by analyzing how important funds of hedge funds are in the industry.

First, from Table 1, we observe that the average FOF is more than 50% larger in terms of AUM than the average hedge fund. Anecdotal evidence suggests that institutional investors prefer hedge funds that are larger, over 200 million in AUM, so it appears that funds of funds are more likely to fall onto the radar screen of institutions.

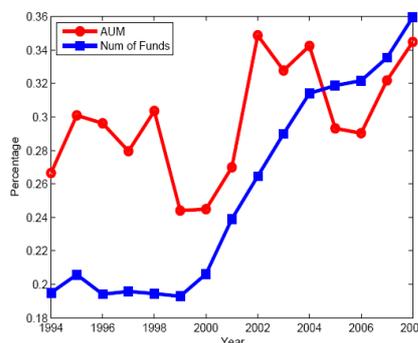


FIGURE 1 – RELATIVE IMPORTANCE OF FUNDS OF HEDGE FUNDS

In order to analyze the relative importance of the FOFs in the industry, in Figure 1 we plot the number of funds of hedge funds as well as their AUM relative to the entire industry excluding the funds of funds themselves. Figure 1 tells an interesting story: The size of AUM for FOFs *increased* slightly over time relative to the size of the industry. FOFs manage roughly a third of the assets in the hedge fund industry. At the same time the relative number of FOFs also increased relative to the number of funds in the industry. These results suggest that funds of hedge funds are an important part of the hedge fund industry and that their importance did not diminish in time. Funds of funds survived not only crises but also academic research questioning their fees-on-fees (e.g. Brown, Goetzmann, and Liang (2004)) or their underperformance relative to similarly diversified organizations such as multi-strategy funds (Agarwal and Kale (2007)). Moreover, FOFs see their role in the industry increasing even when the

entire industry (including funds of funds themselves) experienced outflows in 2008. Finally, one interesting point is the sharp increase in both number of funds and AUM in the early 2000's - a behavior that almost warrants talking about a FOF bubble. In particular, between 2000 and 2006 the AUM increased 5.5 times, from about \$300 billion in 2000 to \$1.7trillion in 2006. If funds of funds indeed are important for the hedge fund industry, the goal of our study is to elucidate the role they fulfill. We continue by exploring the value added by funds of hedge funds for their investors.

## 2. FUNDS OF HEDGE FUNDS AND THEIR INVESTORS

In the previous section we documented an increase in the relative importance of FOFs in the industry. The most obvious explanation is that investors prefer to invest in FOFs rather than investing directly because of the value added by FOFs both in manager selection and in offering better liquidity than their underlying funds. In order to see if this is the case, in this section we study funds of hedge funds' performance and liquidity from the perspective of their investors. Specifically, we explore whether, relative to the funds they invest in, funds of hedge funds deliver additional performance and liquidity to their investors.

### *2.1. The relative performance of funds of hedge funds and lemon funds*

In this subsection we examine the performance of funds of hedge funds. In order to do so, we perform a set of tests whose results are presented in Table 2. In order to estimate the performance of FOFs relative to the funds they may invest in, we start with the investment opportunity set for FOF managers. In order to include in our analysis a reasonably large cross-section of the FOF industry but at the same time to compare relatively contemporaneous funds, we initially examine all hedge funds with at least one FOF investor and that have at least 5 years of history (from January 2004 to December 2008). In Panel A of Table 2, we consider all possible hedge funds with a FOF investor, while in Panel B we restrict attention to only the funds which are currently open for investment.

As a first test, we extract principal components from the returns of all hedge funds, as this is representative of the investment opportunity set of FOFs. We retain the first 10 principal components, which explain 78.20% of the variance of returns, and regress excess returns of funds of funds on excess returns of the 10 principal components. We then record the distribution of FOF alphas. From Table 2 we observe that the FOF alphas are negative and significantly different from zero. A negative alpha suggests that the manager selection performances of FOF investment strategies are insufficient to cover the extra layer of fees the FOFs charge.

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TABLE 2 – THE PERFORMANCE OF FUNDS OF HEDGE FUNDS  
Panel A: FOFs with complete history during Jan 2004 – Dec 2008 (978 funds)

	Mean	t-stat.	p10	p25	Median	p75	p90
Princ. Comp., All HFs, OLS	-1.15	-11.78	-4.22	-2.47	-1.14	0.25	1.62
Princ. Comp., All HFs, Sharpe style reg.	-1.23	-12.49	-4.14	-2.49	-1.25	0.12	1.68
Princ. Comp., Open Funds, OLS	-1.02	-10.46	-4.16	-2.32	-1.06	0.28	1.77
Princ. Comp., Open Funds, Sharpe style reg.	-2.12	-21.78	-4.87	-3.35	-2.08	-0.74	0.68
FH 8-factor	-1.52	-12.08	-4.92	-3.13	-1.48	0.21	1.97
Strategy Indices, OLS	-3.45	-23.18	-8.1	-5.91	-3.29	-0.83	1.11
Strategy Indices Sharpe style reg.	-2.82	-23.45	-6.4	-4.35	-2.56	-1.24	0.34

Panel B: FOFs with at least 24 months of history during Jan 2004 – Dec 2008 (2,633 funds)

Princ. Comp., All HFs, OLS	-1.48	-14.73	-5.43	-3.18	-1.44	0.28	2.18
Princ. Comp., All HFs, Sharpe style reg.	-1.13	-12.87	-5.85	-3.31	-1.2	0.93	3.31
Princ. Comp., Open Funds, OLS	-1.21	-11.73	-5.25	-2.97	-1.12	0.55	2.74
Princ. Comp., Open Funds, Sharpe style reg.	-2.30	-25.52	-7.21	-4.50	-2.20	-0.19	2.31
FH 8-factor	-1.31	-14.07	-5.56	-3.24	-1.32	0.76	3.35
Strategy Indices, OLS	-3.68	-25.42	-9.91	-6.60	-3.41	-0.6	2.36
Strategy Indices Sharpe style reg.	-3.11	-32.83	-8.28	-5.26	-2.91	-0.94	1.61

For robustness considerations we perform several additional tests. First, we impose the restriction that a hedge fund cannot be shorted. Therefore, a negative alpha from an OLS model may be misleading when the regressors are hedge fund portfolios and some of the betas are negative. From this perspective, in addition to OLS we have also performed Sharpe (1992) style regressions, which restrict the regression factor betas to be positive. The results of these tests are stronger. For example, while the average alpha with respect to principal components is -1.02% annually when we regress FOF returns on the principal components extracted from the returns of funds open to investment, the average alpha becomes -2.12% per year when Sharpe style regressions are used. In some of the models, more than 75% of the FOFs have negative alphas.

Although principal components represent the most direct way to calculate the performance of FOF relative to that of individual hedge funds, these portfolios may not necessarily be investible. We therefore perform an alternative test in which we replace the principal components with strategy indices from Hedge Funds Research. Our result, that the average FOF alpha is negative, continues to hold. Finally, FOFs may exhibit relative underperformance when compared to the average hedge fund, but as long as they exhibit positive risk adjusted performance in the context of a relevant factor model, they may still be a desirable investment. To check if this is the case, in lieu of principal components we regressed the performance of funds on hedge funds on the Fung and Hsieh (2004) factors. The result remains that the average FOF underperforms. These results are consistent with the work of Agarwal and Kale (2007) who argue that FOFs underperforms in fact one particular class of hedge funds, namely multi-strategy funds, both on a net as well as gross basis. Finally, if we replicate our tests using returns from the entire period (January 1994 to December 2008), or if we instead use gross returns for FOFs, we obtain the same qualitative results.

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Why do FOFs underperform even on a gross basis? The most direct analysis of why this is the case should be directed to the individual funds in which FOFs invest. Specifically, we are interested in whether the funds in which FOFs invest are different with respect to performance from the funds without a FOFs among its investors. Table 3 reports the performance of the hedge funds owned by FOFs. In Panel A, we first compare the performance of the funds owned by FOFs with that of the funds without a FOF investor. While the differences in performance are not statistically significant, it appears that FOF-owned hedge funds *outperform* the hedge funds without FOF investors, with differences being between 2 to 23 basis points depending on the sample and the type of portfolio (value weighted or equally weighted). This is a striking result: FOFs underperform individual hedge funds, yet the individual funds in which FOF invest appear to *outperform* the fund in which FOFs do not invest. We investigate three possible explanations of this apparent contradiction.

TABLE 3 – THE PERFORMANCE OF FOF-OWNED HEDGE FUNDS  
Panel A: FOF-owned vs non-FOF-owned

	FOF- Owned HFs	Non-FOF- Owned HFs	Diff.	t-stat
<b>Jan. 1996 - Dec. 2000</b>				
Equally Weighted	1.04	0.98	0.06	0.3385
Value Weighted	0.66	0.64	0.02	0.0831
<b>Jan. 2004- Dec. 2008</b>				
Equally Weighted	0.14	0.09	0.04	0.2352
Value Weighted	0.12	-0.11	0.23	0.9535
<b>Panel B: FOF-owned vs non-FOF-owned, survivorship bias-corrected</b>				
	FOF- Owned HFs	Non-FOF- Owned HFs	Diff	t-stat
<b>Jan. 2004 - Dec. 2008</b>				
Equally Weighted	1.02	0.95	0.07	0.4106
Value Weighted	0.66	0.63	0.03	0.1094
<b>Jan. 2004- Dec. 2008</b>				
Equally Weighted	0.09	-0.03	0.12	0.6521
Value Weighted	0.10	-0.20	0.30	1.2287
<b>Panel C: FOF vs FOF-owned hedge funds</b>				
	FOFs	FOF- Owned HFs	Diff	t-stat
<b>Jan. 1996 - Dec. 2000</b>				
Equally Weighted	1.93	2.73	-0.80	-8.2829
Value Weighted	1.77	1.92	-0.14	-0.9462
<b>Jan. 2004- Dec. 2008</b>				
Equally Weighted	1.52	2.31	-0.79	-13.1229
Value Weighted	1.21	1.89	-0.67	-6.1099

First, the difference in performance we have just documented may be due to survivorship bias. As described by Fung and Hsieh (2002), while hedge funds may not report the last months of their returns

when they become extinct and drop out of a database, these negative end-of-life returns are still reflected in the returns of the FOFs which were invested in the funds which became extinct. In order to see if this explains the underperformance of FOFs, we repeat the analysis of Panel A of Table 3 after we add a return of -10% at the end of the life of each defunct individual fund. The results of these tests are presented in Panel B of Table 3. If FOFs underperforms because the funds in which they are invested become extinct and do not report their last negative returns, we should observe that after correcting for this bias, FOF-owned hedge funds underperform those without a FOF investor. However, as apparent from Panel B of Table 3, this is not the case. In fact, after correcting for this bias, FOF-owned hedge funds *outperform* even more strongly. Repeating the experiment by adding end-of-life returns of -10%, -30% or -70% to the hedge funds which became extinct leaves our result qualitatively unchanged. Therefore, survivorship bias does not appear to explain FOFs' underperformance.

Second, our result that FOFs underperform may be explained by negative timing skills. Specifically, it may be that a FOFs invests in a hedge fund with good past performance, but which turns out an underperformer after FOFs became investors. Unfortunately, we cannot test this hypothesis directly because we observe that an individual hedge fund was associated with a FOF only at the end of our sample period and do not have the specific dates at which the individual hedge fund became associated with a FOF. However, if FOFs have negative time abilities and invest in future underperformers, the same should be true for individual funds grouped by strategies. We thus indirectly test FOFs' negative timing abilities by running Treynor and Mazuy (1966) type timing regressions of the portfolio of gross-of-fees FOF returns on the returns of various hedge funds indices:

$$R_t^{FOF} - r_f = const. + a(R_t^{HFRI} - r_f) + b(R_t^{HFRI} - r_f)^2 + \epsilon_t, \quad (1)$$

where  $R^{HFRI}$  are hedge funds strategy indices from Hedge Funds Research. If negative timing abilities explain FOF underperformance, we should expect that the coefficient of the square term in the above equation is negative. However, as Table 4 illustrates, the only cases in which that coefficient is statistically significant are in fact cases in which the FOFs time the strategy indices *successfully*. We therefore fail to find that the FOF underperformance is explained by their potential investment timing skills.

Finally, one explanation remains, that of the presence of "lemon funds" in the portfolios of FOFs. Specifically, this is the possibility that FOF invest in certain individual hedge funds whose performance may be negative and which are short-lived enough not to individually report to the hedge funds databases, or elect not to report because their performance has been poor. If this is the case, we would observe that the portfolio of FOFs (constructed by taking the gross-of-fees FOF returns) outperforms the

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portfolio of individual, FOF-owned hedge funds. From Panel C of Table 3, we observe that this is indeed the case. In the period from January 2004 to December 2008, for example, the FOF gross-of-fees portfolio underperformed the FOF-owned individual hedge funds by about 70-80 basis points on a risk adjusted basis, and that this performance is statistically significant as well. Finally, as assets under management of FOFs increased from the earlier part of our sample to the latest, the underperformance of FOFs becomes stronger on an asset weighted basis (moving from only 14 basis points in the earlier sample to 67 basis points in the later part of the sample). This is consistent with the hypothesis that more of the "lemon funds" were created, relative to the size of the industry, as more assets poured into FOFs.

TABLE 4 – TIMING ABILITIES OF FOFs

Hedge Fund Index	const.	t-stat	HF index	t-stat	(HF index) <sup>2</sup>	t-stat	R-squared
Panel A: FOF gross return equal weighted portfolio Jan. 2004 - Dec. 2008							
HFRI ED: Distressed/Restructuring Index	0.0147	10.5798	0.8264	9.6821	1.1963	0.6986	75.15
HFRI ED: Merger Arbitrage Index	0.0150	8.3238	1.2468	9.5738	-12.0530	-1.4823	65.93%
HFRI ED: Private Issue/Regulation D Index	0.0174	7.5605	0.6351	5.5458	-8.8780	-1.9541	36.49%
HFRI EH: Equity Market Neutral Index	0.0142	7.9666	1.7983	7.8184	11.9051	0.9177	61.20%
HFRI EH: Short Bias Index	0.0187	8.6243	-0.3291	-3.8018	-2.9322	-1.6484	44.10%
HFRI Emerging Markets (Total) Index	0.0129	12.7929	0.4921	16.8377	0.5668	1.5552	88.20%
HFRI Equity Hedge (Total) Index	0.0157	18.3052	0.7137	17.5327	0.7477	1.0508	90.42%
HFRI Event-Driven (Total) Index	0.0147	14.3641	0.8433	15.2221	0.7856	0.6727	86.12%
HFRI Macro (Total) Index	0.0140	6.0204	0.8161	5.7331	-5.4981	-0.8219	37.30%
HFRI Relative Value (Total) Index	0.0137	13.5442	1.4964	14.0368	9.7894	5.4973	85.24%
HFRI RV: Fixed Income-Asset Backed	0.0144	5.2400	1.0412	3.0886	-8.4545	-0.4247	26.65%
HFRI RV: Fixed Income-Convertible Arbitrage Index	0.0185	12.9977	0.8976	7.1949	3.1942	3.4502	66.46%
HFRI RV: Fixed Income-Corporate Index	0.0167	10.9247	0.9203	7.0806	3.4625	2.0252	63.19%
HFRI RV: Yield Alternatives Index	0.0158	8.1424	0.5670	5.4630	0.7193	0.3916	51.20%
Panel B: FOF gross return value weighted portfolio Jan. 2004 - Dec. 2008							
HFRI ED: Distressed/Restructuring Index	0.0121	9.1133	0.7386	9.0619	-0.4987	-0.3049	75.49%
HFRI ED: Merger Arbitrage Index	0.0123	6.8532	1.1389	8.7361	-16.0554	-1.9724	63.07%
HFRI ED: Private Issue/Regulation D Index	0.0145	6.6338	0.6085	5.5843	-10.3855	-2.4022	37.79%
HFRI EH: Equity Market Neutral Index	0.0112	6.1304	1.6380	6.9865	8.8353	0.6682	56.40%
HFRI EH: Short Bias Index	0.0158	7.5072	-0.2776	-3.3111	-3.6308	-2.1075	45.28%
HFRI Emerging Markets (Total) Index	0.0105	9.8256	0.4393	13.9656	0.0054	0.0139	85.57%
HFRI Equity Hedge (Total) Index	0.0130	14.4586	0.6357	14.8611	-0.4032	-0.5393	88.56%
HFRI Event-Driven (Total) Index	0.0121	11.7413	0.7552	13.5072	-0.8981	-0.7820	84.71%
HFRI Macro (Total) Index	0.0108	4.5943	0.7308	5.1524	-4.0552	-0.6084	32.67%
HFRI Relative Value (Total) Index	0.0109	11.1975	1.3492	13.0960	7.2558	4.2160	85.09%
HFRI RV: Fixed Income-Asset Backed	0.0113	4.3773	1.0180	3.2069	-11.5897	-0.6183	29.67%
HFRI RV: Fixed Income-Convertible Arbitrage Index	0.0152	11.4650	0.8090	6.9629	2.4886	2.8861	68.53%
HFRI RV: Fixed Income-Corporate Index	0.0136	9.3964	0.8271	6.7160	2.1947	1.3530	64.16%
HFRI RV: Yield Alternatives Index	0.0129	6.7595	0.5045	4.9604	-0.0629	-0.0350	49.31%
Panel C: FOF gross return equal weighted portfolio Jan. 1996 - Dec. 2000							
HFRI ED: Distressed/Restructuring Index	0.0199	9.4860	0.8442	7.4354	3.8072	1.8881	51.79%
HFRI ED: Merger Arbitrage Index	0.0212	5.4634	0.5658	1.9445	-3.7560	-0.5487	15.07%
HFRI ED: Private Issue/Regulation D Index	0.0183	5.3955	0.4346	2.6699	1.0318	0.3997	24.00%
HFRI EH: Equity Market Neutral Index	0.0215	7.2049	0.7137	2.5171	-3.6513	-0.2366	12.51%
HFRI EH: Short Bias Index	0.0246	10.6751	-0.1641	-6.3369	-0.0370	-0.1918	41.95%
HFRI Emerging Markets (Total) Index	0.0227	12.8317	0.3064	9.7147	0.3451	1.3327	63.33%
HFRI Equity Hedge (Total) Index	0.0182	9.5928	0.4761	8.5663	0.0487	0.0543	62.23%
HFRI Event-Driven (Total) Index	0.0166	8.1930	0.7822	9.3090	3.3535	2.1830	60.91%
HFRI Macro (Total) Index	0.0213	16.4650	0.7491	15.3481	-0.0770	-0.0553	84.20%
HFRI Relative Value (Total) Index	0.0190	6.2465	0.9369	3.8628	2.5197	0.4380	27.21%
HFRI RV: Fixed Income-Asset Backed	0.0231	8.2477	0.5161	2.0003	3.2321	0.8926	8.83%
HFRI RV: Fixed Income-Convertible Arbitrage Index	0.0193	6.5666	1.0738	4.6855	-8.5802	-0.8147	28.81%
HFRI RV: Fixed Income-Corporate Index	0.0238	10.4100	0.8316	4.6533	2.5219	0.6780	36.31%
HFRI RV: Yield Alternatives Index	0.0243	9.2801	0.4165	4.1272	-2.3269	-0.9780	23.55%
Panel D: FOF gross return value weighted portfolio Jan. 1996 - Dec. 2000							
HFRI ED: Distressed/Restructuring Index	0.0186	7.8818	0.9066	7.0959	3.1792	1.4011	50.52%
HFRI ED: Merger Arbitrage Index	0.0197	4.5888	0.6127	1.8978	-4.7656	-0.6274	15.26%
HFRI ED: Private Issue/Regulation D Index	0.0143	4.2199	0.5041	2.7602	0.3281	0.1133	22.45%
HFRI EH: Equity Market Neutral Index	0.0202	6.1254	0.8886	2.7769	-9.1509	-0.5375	13.70%
HFRI EH: Short Bias Index	0.0242	9.1763	-0.1706	-5.7634	-0.1806	-0.8196	38.51%
HFRI Emerging Markets (Total) Index	0.0214	10.3788	0.3226	8.9516	0.3297	1.0926	59.61%
HFRI Equity Hedge (Total) Index	0.0171	7.4938	0.5162	7.7139	-0.5413	-0.5011	55.63%
HFRI Event-Driven (Total) Index	0.0147	6.4544	0.8629	9.1862	3.4629	2.0164	60.40%
HFRI Macro (Total) Index	0.0200	13.0799	0.8326	14.3760	-0.8058	-0.4871	81.97%
HFRI Relative Value (Total) Index	0.0180	5.2720	0.9631	3.5503	0.3780	0.0588	26.20%
HFRI RV: Fixed Income-Asset Backed	0.0220	7.1574	0.5641	2.0169	2.3904	0.6019	11.12%
HFRI RV: Fixed Income-Convertible Arbitrage Index	0.0182	5.6140	1.1905	4.7235	-14.9753	-1.2929	30.21%
HFRI RV: Fixed Income-Corporate Index	0.0227	9.0478	0.9108	4.6446	1.7395	0.4262	37.84%
HFRI RV: Yield Alternatives Index	0.0235	7.9319	0.4273	3.7468	-3.2682	-1.2153	20.85%

In the next subsection we investigate how investing in funds of funds compares to direct investment in hedge funds from a liquidity perspective.

### 2.2. A "lemon funds" index

If FOFs underperform because they invest in funds with poor performance, which do not report to databases, then we may create an index indicative of the performance of these "lemon funds" by subtracting the returns of all hedge funds from the returns of FOFs or alternatively, by subtracting from the returns of FOFs the returns of those funds in which FOF invest but which report to databases.

If indeed this "lemon index" reflects the performance of problem funds, then we should expect that a hedge fund with a higher exposure to this index will be a problematic fund as well. In order to see that this is the case, we form portfolios of individual funds sorted by their exposure to our lemon index and then study the risk-adjusted performance of these portfolios.

Table 5 presents the difference in the risk-adjusted performance of the funds with high lemon index loadings and those with low lemon index loadings. From the Table, we observe that the highest lemon index loadings quintile funds underperforms the portfolio of the funds in the lowest lemon loadings quintile by 52 to 159 basis points per month, depending how these exposures were calculated. For asset weighed portfolios, these differences are statistically significant as well.

TABLE 5 – PERFORMANCE OF FUNDS SORTED BY EXPOSURE TO THE "LEMON INDEX"  
Panel A: Lemon index as returns of FOFs minus the returns of all individual hedge funds

	Equally Weighted		Value Weighted	
	alpha	t-stat	alpha	t-stat
Q1 (larger lemon beta)	-0.0012	-0.4058	0.0008	0.1901
Q2	-0.0010	-0.5438	-0.0001	-0.0264
Q3	-0.0005	-0.4111	0.0008	0.4526
Q4	0.0003	0.2180	0.0005	0.2746
Q5 (smallest lemon beta)	0.0040	1.5816	0.0167	4.7443
Q1 - Q5	-0.0052	-1.3565	-0.0159	-2.9063

Panel B: Lemon index as returns of FOFs minus the returns of FOF-owned hedge funds

	Equally Weighted		Value Weighted	
	alpha	t-stat	alpha	t-stat
Q1 (larger lemon beta)	-0.0035	-1.4192	-0.0080	-2.2056
Q2	-0.0046	-2.6721	-0.0066	-2.9150
Q3	-0.0025	-1.8482	-0.0007	-0.4087
Q4	-0.0003	-0.2338	0.0000	-0.0048
Q5 (smaller lemon beta)	-0.0006	-0.2369	0.0068	2.0337
Q1 - Q5	-0.0029	-0.8257	-0.0148	-3.0001

### **2.3. The relative liquidity of funds of funds**

Funds of hedge funds are in principle diversified; thus, they should offer their investors better liquidity terms than investors would obtain by investing directly in stand-alone hedge funds. In this subsection we investigate this issue.

In order to compare the liquidity offered by funds of funds with that offered by the funds in which they invest, we analyze three fund characteristics determining the liquidity offered by funds to their investors. The first is the lockup period. This is the time period a new investor in a hedge fund is precluded from taking their capital out. Hedge funds may engage in strategies which attempt to earn a premium for holding illiquid assets. In order for the funds to execute these strategies, investors need to keep their capital in the funds. Lockup periods accomplish exactly this task. Consistent with this idea, Aragon (2007) finds that funds with longer lockup periods do indeed exhibit higher alphas. The other two liquidity measures we analyze represent the "immediate" liquidity offered by hedge funds. They are, respectively, redemption frequency, which expresses how often investors are allowed to withdraw money from the fund, and the redemption notice period, which is waiting time for an investor to receive the proceeds of their withdrawn investment.

Although funds of funds are a diversified portfolio of funds and thus in theory can offer better liquidity terms than the average hedge fund in their portfolio, we should not expect all the liquidity measures enumerated above to be better for funds of hedge funds. For example, despite diversification, unless it holds cash a fund of funds still needs to have a longer redemption notice period than each of the stand-alone funds in its portfolio. Panel A of Figure 2 presents asset weighted redemption notice periods for funds of funds as well as for the funds owned at least partially by a fund of funds. Consistent with our expectation, funds of funds require advanced withdrawal notifications of around 10 days. Furthermore, this spread has doubled in the last 5 years of our sample.

While we cannot expect funds of hedge funds to exhibit better (i.e., shorter) redemption notice periods than the funds they hold, we would expect, due to diversification, that fund of funds offer better (i.e. shorter) lockup periods as well as more generous (i.e., more frequent) redemption frequencies than the funds in which they invest. Panels B and C of Figure 2 present the asset weighted redemption frequencies and respectively lockup periods for funds of funds and for the funds in which they are invested. In the early half of our sample funds of funds did offer better liquidity terms. However, we observe a reversal of those terms in the second half of the sample. As apparent from the Figure, the liquidity terms offered by funds of hedge funds to their investors are, in the most recent period of our sample, worse than what the investors could have obtained by investing directly in hedge funds.

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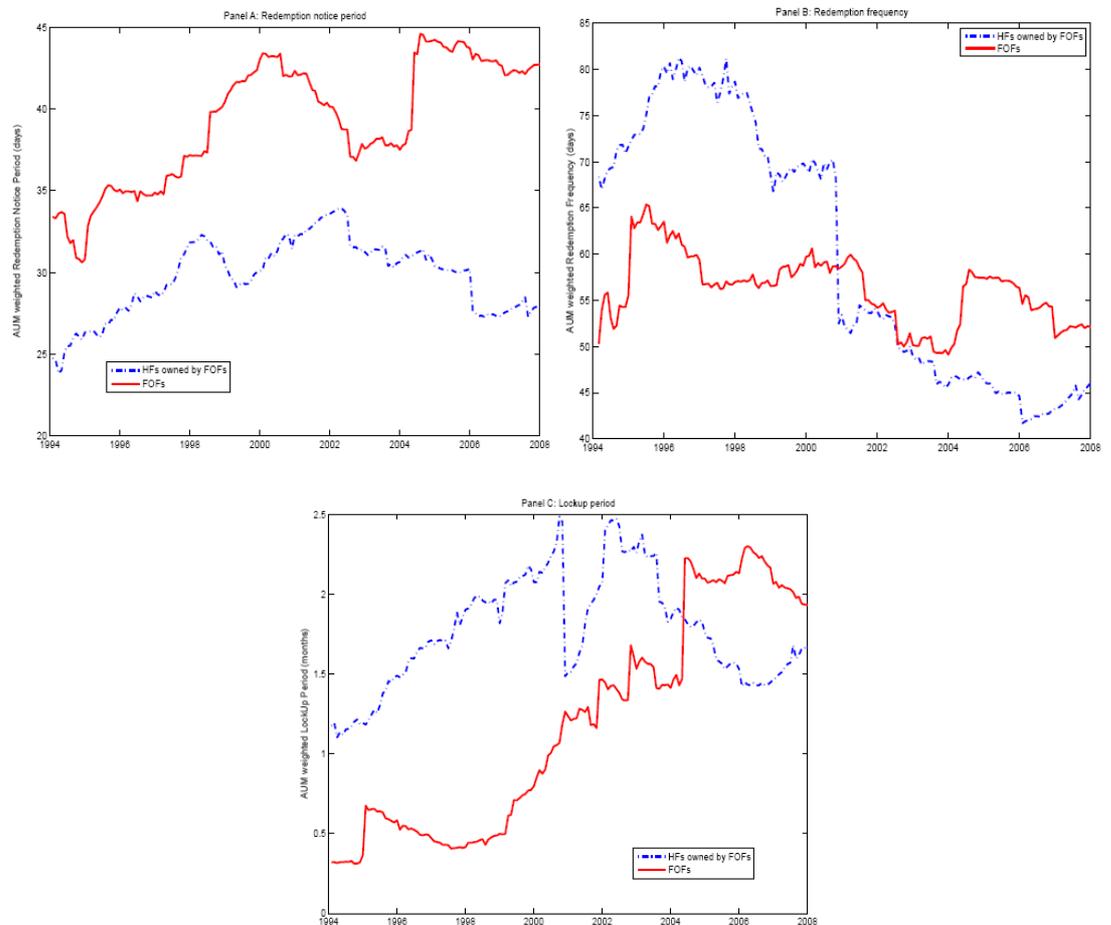


FIGURE 2 – LIQUIDITY OF FUNDS OF HEDGE FUNDS AND THE FUNDS THEY INVEST IN

We thus conclude that funds of hedge funds do not generate outperformance nor offer better liquidity terms than what investors could obtain, were they able to directly invest in the same hedge funds that are held by funds of hedge funds. In the next section we investigate the role played by funds of funds for the hedge funds industry.

These findings suggest that lemon fund engage in strategies Shot underperform and the funds exposed to the strategies underperform those who are hot exposed.

**3. FUNDS OF FUNDS AND THE HEDGE FUNDS INDUSTRY**

In the previous section we have documented that funds of hedge funds do not seem to create more favorable liquidity or performance terms for their investors, than if the investors can themselves obtain, would they directly invest in stand-alone hedge funds. In this section we examine the role played by funds of funds for stand-alone hedge funds.

### 3.1. Funds of funds and hedge funds' prime brokers

In this subsection we study the number of prime brokers employed by a stand-alone hedge fund which is owned by a fund of funds. Our premise is that having a FOF among investors will facilitate a hedge fund's access to capital, thus, increase the number of trading programs as well as access to more brokers.

TABLE 6 – FUNDS OF FUNDS AND PRIME BROKERS

Strategy type	FOF-owned HF's	Non-FOF-owned HF's	Difference	p-value
Managed Futures	1.24 [102]	1.05 [146]	0.19	0.00
Equity market-neutral	1.04 [57]	1.06 [153]	-0.02	0.53
Multistrategy	1.14 [98]	2.05 [201]	0.09	0.07
Fixed income arbitrage	1.00 [49]	1.05 [79]	-0.05	0.11
Dedicated short	1.00 [6]	1.00 [10]	0.00	1.00
Global Macro	1.13 [62]	1.09 [93]	0.04	0.51
Convertible arbitrage	1.14 [50]	1.21 [58]	-0.07	0.56
Event driven	1.15 [91]	1.10 [190]	0.05	0.36
Emerging markets	1.04 [76]	1.06 [121]	-0.02	0.63
Equity long-short	1.08 [504]	1.03 [909]	0.05	0.00

From Table 6, we observe that generally, funds having at least one fund of funds investor indeed have more prime brokers. The particular strategies where this is not the case are the statistical arbitrage and the emerging markets categories; for these cases the differences are not statistically significant.

We thus conclude that having a FOF among its investors does not appear to reduce front-running risk, nor provide significantly better access to more trading programs.

### 3.2. Funds of funds and hedge funds flows

In this subsection we investigate whether hedge funds with fund of funds investors receive more flows than other hedge funds.

To do so, in Table 7 we report time series averages of quarterly flows for hedge funds with at least a fund of funds investor as well as for funds without one. Since past performance may affect flows, we reports break the funds into nine past performance bins. Finally, we have broken the reporting into two subperiods: Panel A includes the time period from 1996 to 2000 while Panel B reports from 2004 to 2008.

WHO BENEFITS FROM FUNDS OF HEDGE FUNDS? A CRITIQUE OF ALTERNATIVE ORGANIZATIONAL STRUCTURES IN THE HEDGE FUND INDUSTRY (II)

TABLE 7 – FUNDS OF FUNDS AND FUND FLOWS

Quarterly Performance Quartile	Average quarterly flow		Difference
	FOF-owned HF's	non-FOF-owned HF's	
Panel A: January 1996 to December 2000			
1	3.99%	4.00%	-0.01%
2	4.61%	5.79%	-1.18%
3	6.04%	5.26%	0.78%
4	6.17%	5.17%	1.00%
5	6.45%	6.57%	-0.13%
6	8.72%	7.25%	1.47%
7	5.41%	6.23%	-0.81%
8	6.40%	5.16%	1.23%
9	9.50%	6.16%	3.33%
Panel B: January 2004 to December 2008			
1	2.38%	2.31%	0.06%
2	1.78%	1.50%	0.28%
3	2.59%	2.19%	0.40%
4	1.22%	1.78%	-0.56%
5	1.99%	1.73%	0.26%
6	2.33%	2.32%	0.01%
7	2.16%	3.06%	-0.90%
8	4.80%	3.81%	0.99%
9	5.42%	4.32%	1.10%

We observe that in the early period, having a fund of funds among investors aided good performers to receive flows. For example, the funds in the best performing bin received 3.33% more inflows per quarter, on average, than the funds without a fund of fund investor. In contrast, the funds in the worst performing decile experience a 0.01% more *outflow* per quarter when they have a fund of funds among their investors.

For the most recent time period this ceases to be the case, as apparent from Panel B of Table 7. Having a fund of funds among its investors only *increases* the flows into a hedge fund, regardless of performance. However, the increase in flows associated with having a fund of funds among your investors appears to have decreased in magnitude in the recent period.

**3.3. Funds of funds and hedge funds performance**

In this subsection we investigate whether funds of funds aid the funds in which they invest to outperform. The mechanism through which funds of funds may aid the funds in which they are invested to outperform may consist of monitoring or in information sharing.

To investigate if this is the case, we form portfolios of funds with and without a fund of funds investor. We form either equally weighted or value weighted portfolios, and analyze their alpha with respect to the Fung and Hsieh factors. Since Fung, Hsieh, Naik, and Ramadorai (2008) argue that there may have been a structural shift in the performance of funds of funds, we perform our analysis on subperiods.

Although, consistent with de Roon, Guo, and ter Horst (2010), portfolios of funds with fund of funds investors have higher alphas, in unreported results the difference was not statistically significant in our

sample. We cannot therefore conclude that funds of funds facilitate the outperformance of the funds in which they invest.

### 3.4. Funds of funds flows and industry performance

In this section we analyze the effect that funds of funds flows have on the hedge fund industry. There are two channels through which we expect the FOF flows to influence the hedge funds alphas. First, as in Berk and Green (2004), flows into hedge funds in general depress alpha, and this effect has been documented in several studies, among which most recent is that of Teo (2010). The question is whether funds of funds do so to a greater extent than stand-alone hedge funds. This may happen, for example, because the FOF managers are less able to estimate hedge fund strategies' capacities than the hedge fund managers themselves.

In order to analyze if this is the case, we calculate 24-month rolling flows into FOFs and stand-alone hedge funds separately. We also calculate concomitant 24-month rolling alphas with respect to the Fung-Hsieh factors for stand-alone hedge funds, and then analyze how the distribution of hedge fund alphas changes as capital flow into or out of fund of funds. In order to quantify the importance of flows on alphas, we have regressed the first four moments of the distribution of alpha (mean, standard deviation, skewness and kurtosis) on concomitant hedge fund and FOF flows. The results are presented in Table 8. From the Table, we observe that both stand-alone as well as FOF flows are associated with a smaller mean of the hedge fund alphas. However, FOF flows contribute to a greater degree to this decrease. In fact, as apparent from the Table, flows into FOF depress the average alpha more than twice as much as the flows into hedge funds directly.

TABLE 8 – FUNDS OF FUNDS FLOWS AND THE DISTRIBUTION OF HEDGE FUND ALPHAS

	Average $\alpha$	Std. of $\alpha$	Skewness of $\alpha$	Kurtosis of $\alpha$
Intercept	0.0043	0.0112	0.6396	18.2520
(t-stat)	11.5142	29.9502	7.2922	19.4404
Flow into HF's ( $\beta^{HF}$ )	0.0556	0.1055	8.2782	-137.9136
(t-stat)	2.6348	5.0282	1.6872	-2.6261
Flow into FOF ( $\beta^{FOF}$ )	-0.1272	-0.1033	-12.9834	-265.0520
(t-stat)	-5.1184	-4.1850	-2.2486	-4.2888
Adj. $R^2$	19.21%	23.75%	4.31%	16.39%
$\beta^{FOF} - \beta^{HF}$	-0.1828	-0.2087	-21.2616	-127.1384
(t-stat)	-5.6065	-6.4451	-2.8060	-1.5677

We next analyze the effect of flows on the cross-sectional dispersion of alphas. While flows into stand-alone hedge funds *increase* the dispersion of alphas (suggesting that managers with viable ideas were the ones experiencing inflows) flows into FOFs *decrease* the alpha dispersion. This suggests that when

FOF receive inflows, they dispense of the capital in a manner which makes the identification of outperforming managers more difficult.

The relationship between flows and skewness is similar in spirit to the relationship between flows and the cross-sectional dispersion of alpha. While the relationship between hedge fund flows and alpha skewness is insignificant, flows into FOFs are associated with more negative skewness in alphas.

For kurtosis, both hedge funds and FOF flows are associated with a decrease in kurtosis. Given that FOF flows are associated more negative skewness, we conclude that the effect of FOF flows on the tails of the distribution of hedge funds alphas is that the right tails of this distribution are curtailed above and beyond the effect on the left tails.

Therefore, we conclude that FOF flows negatively impact the hedge fund industry above and beyond the impact expected from stand-alone hedge funds flows. Having argues that, we go one step forward and analyze whether flows into FOFs trigger the appearance of "lemon funds". To do so, for each month  $t$  we construct the flows into hedge funds and FOF universe during month  $t$ . We also construct value weighted and equally weighted portfolios of funds that are, respectively, less than one year old, between one and two, between two and three, and finally more than three years old. We also separate these portfolios by whether the funds have a FOF investor or not. For each of these portfolios, we calculate alphas on the subsequent year, from month  $t + 1$  to month  $t + 12$ . We then regress the alphas on the flows, also controlling for the magnitudes of both the hedge funds' and the FOFs' AUM.

TABLE 9 – FUNDS OF FUNDS FLOWS AND THE DISTRIBUTION OF HEDGE FUND ALPHAS

	Equally Weighted		Value Weighted	
	All HF	FOF-owned HF	All HF	FOF-owned HF
Less than 1 year	-0.0310	-0.0385	-0.0258	-0.0392
t-stat	-2.5041	-2.1462	-0.9191	-2.3631
1-2 years	-0.0307	-0.0382	-0.0313	-0.0389
t-stat	-2.4279	-2.0355	-2.4784	-2.2371
2-3 years	-0.0297	-0.0500	-0.0294	-0.0502
t-stat	-1.8995	-2.6692	-1.9022	-2.7550
More than 3 years	-0.0271	-0.0265	-0.0287	-0.0318
t-stat	-2.2758	-1.9493	-2.2771	-2.2404
Older minus Younger	0.0039	0.0120	-0.0028	0.0073
t-stat	0.5515	0.9309	-0.1031	0.6009

The results are presented in Table 9. From the Table, flows into FOFs are associated with *lower* subsequent alphas for all the funds, while the effect is generally stronger for the younger hedge funds, albeit statistically insignificant. Although Aggarwal and Jorion (2010) document that emerging managers outperform, we document that their performance is reduced when FOFs receive flows.

#### 4. CONCLUSIONS

In this paper we investigate the role of funds of funds for investors as well as for the hedge fund industry. We find that fund of funds do not generate excess performance on top of that investors can achieve, and do not offer better liquidity terms than the average hedge fund. On the other hand, we find that hedge funds facilitate flows into funds and access to capital in general without however improving the funds' performance. This suggests that fund of funds would be more appropriate in their role as advisors to investors, than in their role of information facilitators or portfolio managers.

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