Investor Flows and Share Restrictions in the Hedge Fund Industry

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Motivation

- **We study the flow-performance relation for individual hedge funds**

- **Flow behavior is important in understanding:**
  - Structure and survival characteristics of hedge fund markets
  - Impact of hedge funds on markets (stabilizing or destabilizing?)
  - Financial contagion

- **Hedge fund flows are complicated by both direct share restrictions and restrictions implied by asset illiquidity**
  - We are the first to formally study restrictions

- **Distinguish money flows into live database funds from flows to funds in defunct database**

- **Study "smart money" effect under share restrictions**

Literature

- **Fund Flow-Performance:**
  - Sirri and Tufano (1998) (MF, convex)
  - Chevalier and Ellison (1997) (MF, convex)
  - Del Guercio and Tkac (2002) (Pension less convex than Mutuals)
  - Goetzmann, Ingersoll and Ross (2003) (HF, concave)
  - Agarwal, Daniel and Naik (2004) (HF, convex)
  - Baquero and Verbeek (2005) (HF, linear)

- **Smart Money Effect:**
  - Gruber (1996)
  - Zheng (1999)
  - Wermers (2004)
  - Barquero and Verbeek (2005)

Restrictions on Hedge Fund Flows

- Restrictions on Inflows
  - Capacity/Style
  - Onshore/Offshore
  - Subscription frequency
- Restrictions on outflows
  - Lockup
  - Redemption frequency
  - Advance notice period
- Asset illiquidity may affect flows as well

Results

- Hedge fund investors chase performance
- With share restrictions the fund flow-performance relation is concave; it is convex without share restrictions-consistent with the mutual fund literature
- Flow-performance relationship differs for live and defunct funds
- For live funds, flow-performance relationship is concave:
  - Closure to new investment
- For defunct funds, flow-performance relationship is convex:
  - Bifurcation (liquidation vs. voluntary withdrawal)
- Find presence of smart money effect: flows can predict future performance. However, this effect is reduced by share restrictions

Hypothesis 1
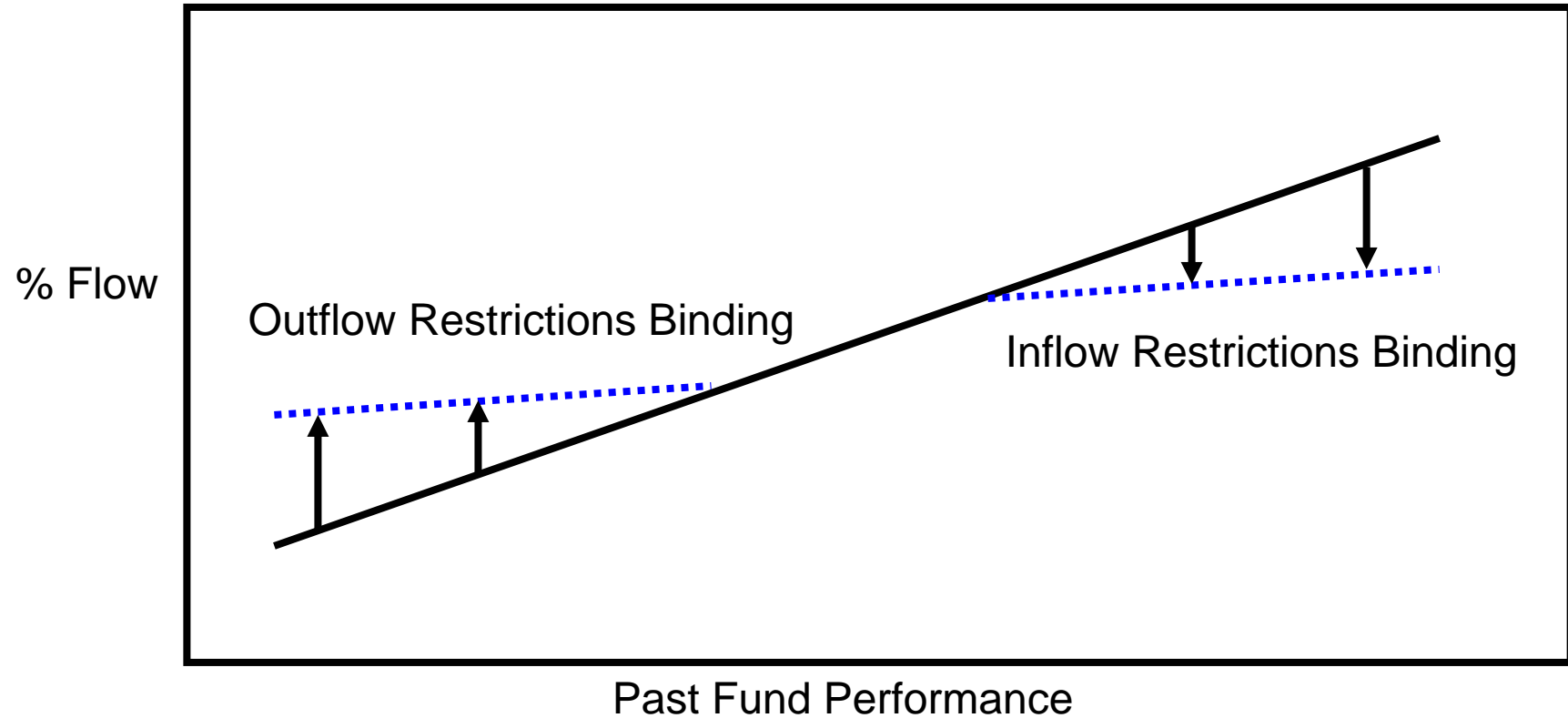
- ## **<u>Share Restrictions and Asset Illiquidity</u>**

  - **Direct Effect (Binding Restriction)**

    - **Lower outflows from poor performers**

    - **Lower inflows to good performers**

    - **Lower flow sensitivity to past performance**

Direct Effect of Restrictions

% Flow

Outflow Restrictions Binding

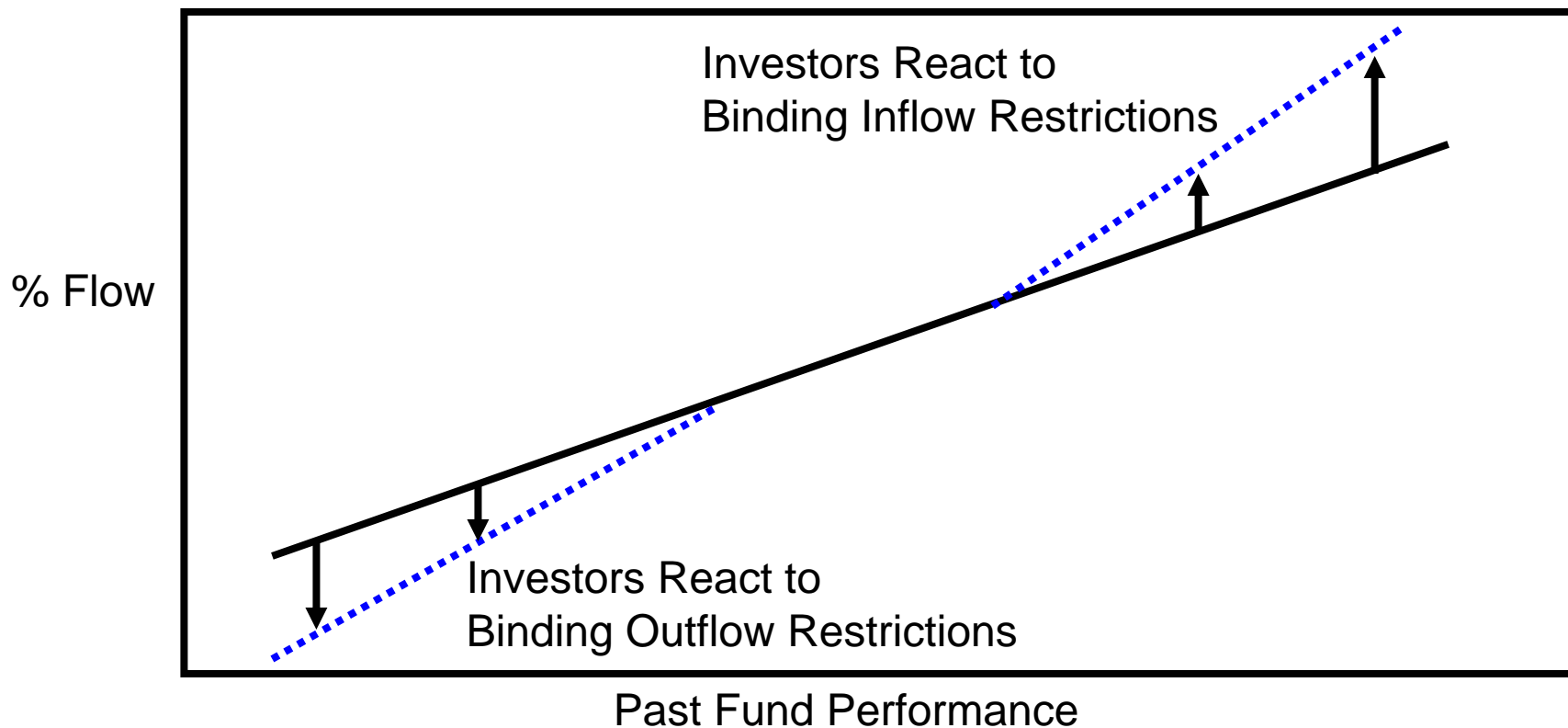Inflow Restrictions Binding

Past Fund Performance

Hypothesis 1

- **<u>Share Restrictions and Asset Illiquidity</u>**

  - **Indirect Effect (Investor Expectation of Future Binding Restriction)**

    - **Higher inflows to poor performers**

    - **Higher outflows from good performers**

    - **Higher flow sensitivity to past performance**

Indirect Effect of Restrictions

Investors React to
Binding Inflow Restrictions

% Flow

Investors React to
Binding Outflow Restrictions

Past Fund Performance

Hypothesis 2

- ## Live vs. Defunct Funds

  Live funds: concave flow-performance relation due to voluntary closures of good performers

  Defunct funds: convex flow-performance relation due to different exit reasons:

  - well-performing funds attract substantial new investments
  - poorly-performing funds liquidate

Hypothesis 3

- ## <u>Smart Money Effect</u>

  - ### Direct Effect (Binding Restriction)

    - **Lower ability of flows to respond to expected future performance—lower performance of flows**

Data

- TASS database
- Time: January 1993 – December 2004
- 11 Distinct categories
- Eliminated funds with
  - gross returns
  - stale pricing
  - less than 12 months of observations
  - missing assets under management
- 4,594 funds in the combined database (75% of the initial fund sample size of 6,097)

Measuring Flows

- Monthly returns are used to estimate flows
- End-of-month flow assumed

$$Flow_t = \frac{Assets_t - Assets_{t-1}(1 + r_t)}{Assets_{t-1}}$$

Fund Flow Model

- Performance Ranks (Sirri and Tufano (1998)):

    Trank1=Min(1/3, Frank)

    Trank2=Min(1/3, Frank- Trank1)

    Trank3=Min(1/3, Frank- Trank1- Trank2)

- Fund Flows Model:
  - %Flow = a(Trank1) + b(Trank2) + c(Trank3)+ (Control Variables)

$$Flow_{i,t} = \alpha_i + \beta_1 Trank_{i,t-1}^1 + \beta_2 Trank_{i,t-1}^2 + \beta_3 Trank_{i,t-1}^3 + \beta_4 SD_{i,t-1} + \beta_5 Assets_{i,t-1}$$
$$+ \beta_6 Live_i + \beta_7 NoticePeriod_i + \beta_8 OpentoPublic_i + \beta_9 HighWaterMark_i$$
$$+ \beta_{10} Leveraged_i + \beta_{11} ManagementFee_i + \beta_{12} IncentiveFee_i + \beta_{13} LockupPeriod_i$$
$$+ \beta_{14} RedemptionFrequency_i + \beta_{15} SubscriptionFrequency_i + \beta_{16} StyleEffect_i$$

Asset Illiquidity

- Asset illiquidity measures (Getmansky, Lo, and Makarov (2004)):

$$R_t^0 = \theta_0 R_t + \theta_1 R_{t-1} + \theta_2 R_{t-2}$$

$$\theta_j \in [0,1], \, j = 0,1,2$$

$$\theta_0 + \theta_1 + \theta_2 = 1$$

Table III Restriction Parameters

Parameters	N	Mean	Median	Stdev	Min	Max
Subscription	3290	40.61	30.00	35.75	1.00	360
Redemption	3314	81.71	30.00	80.56	1.00	360
Adv. notice	3435	29.08	30.00	25.69	0.00	180
Total redemption	3310	111.86	60.00	93.81	1.00	540
Lockup	3425	90.99	0.00	174.42	0.00	2700
Onshore	3448	0.38	0.00	0.48	0.00	1
Cap. constraint	3448	0.29	0.00	0.45	0.00	1
Illiquidity	950	0.90	0.86	0.23	0.44	2.89

Table III Illiquidity Measure as a Proxy for Share Restrictions

		Low Liquidity			High Liquidity			
	N	Mean	Median	N	Mean	Median	Diff	
Subscription	460	47.16	30	434	42.04	30	5.12	**
Redemption	462	99.06	120	444	78.65	30	20.59	***
Adv. notice	474	35.10	30	475	23.37	20	11.73	***
Total redemption	462	134.87	137.5	444	103.58	60	31.29	***
Lockup	471	2.91	0.00	474	2.28	0.00	0.63	*
Onshore	475	0.37	0.00	475	0.45	1.00	-0.08	**
Cap. constraint	475	0.40	0.00	475	0.18	0.00	0.22	***

Table IV Flow-Performance Relation: All Funds

Variable	Estimate	*t*-value	
Intercept	2.280	5.44	***
Low Performance	0.921	5.33	***
Middle Performance	0.906	6.36	***
High Performance	0.906	4.00	***
Fund Character	Yes		
Obs.	692		
Adj. R^2	13.38%		

Table V Flow-Performance and Asset Illiquidity

Variable	Estimate		With illiquidity
Intercept	2.093	***	
Low Performance	0.720	***	1.258
Middle Performance	0.786	***	0.954
High Performance	0.870	***	0.178
Low Perf*Low liquidity	0.538	***	
Middle Perf*Low liquidity	0.168		
High Perf*Low liquidity	-0.692	***	
Fund Character	Yes		Yes
Obs.	482		
Adj. R^2	12.7%		

Table V Flow-Performance Relation with Redemption and Capacity Constraints

Variable	Estimate	*t*-value		With Restrictions
Intercept	2.076	3.82	***	
Low Performance	0.555	1.60		1.651
Middle Performance	1.076	3.65	***	0.384
High Performance	0.752	1.98	*	0.196
Low Perf*Redemption	0.598	2.13	*	
Low Perf*Capacity	0.498	2.82	**	
Middle Perf*Redemption	-0.521	-1.66		
Middle Perf*Capacity	-0.171	-0.56		
High Perf*Redemption	0.179	0.39		
High Perf*Capacity	-0.735	-2.24	**	
Fund Character	Yes			Yes
Obs.	482			
Adj. R^2	12.51%			

Table V Flow-Performance with All Restrictions

Variable	Estimate	*t*-value		With Restrictions
Intercept	2.178	3.74	***	
Low Performance	0.713	1.75		1.777
Middle Performance	0.891	2.45	**	0.251
High Performance	1.097	2.77	**	0.583
Low Perf*Sum Restrictions	1.064	--		
Middle Perf*Sum Restrictions	-0.640	--		
High Perf*Sum Restrictions	-0.514	--		
Fund Character	Yes			Yes
Obs.	482			
Adj. R^2	14.1%			

Fund-Flow Relationship

- Convex without restrictions
- Concave with restrictions

Effect of Restrictions

% Flow

Investors Do Not Appear to
Be Able to Forecast
Binding Inflow Restrictions

Investors React to
Binding Outflow Restrictions

Past Fund Performance
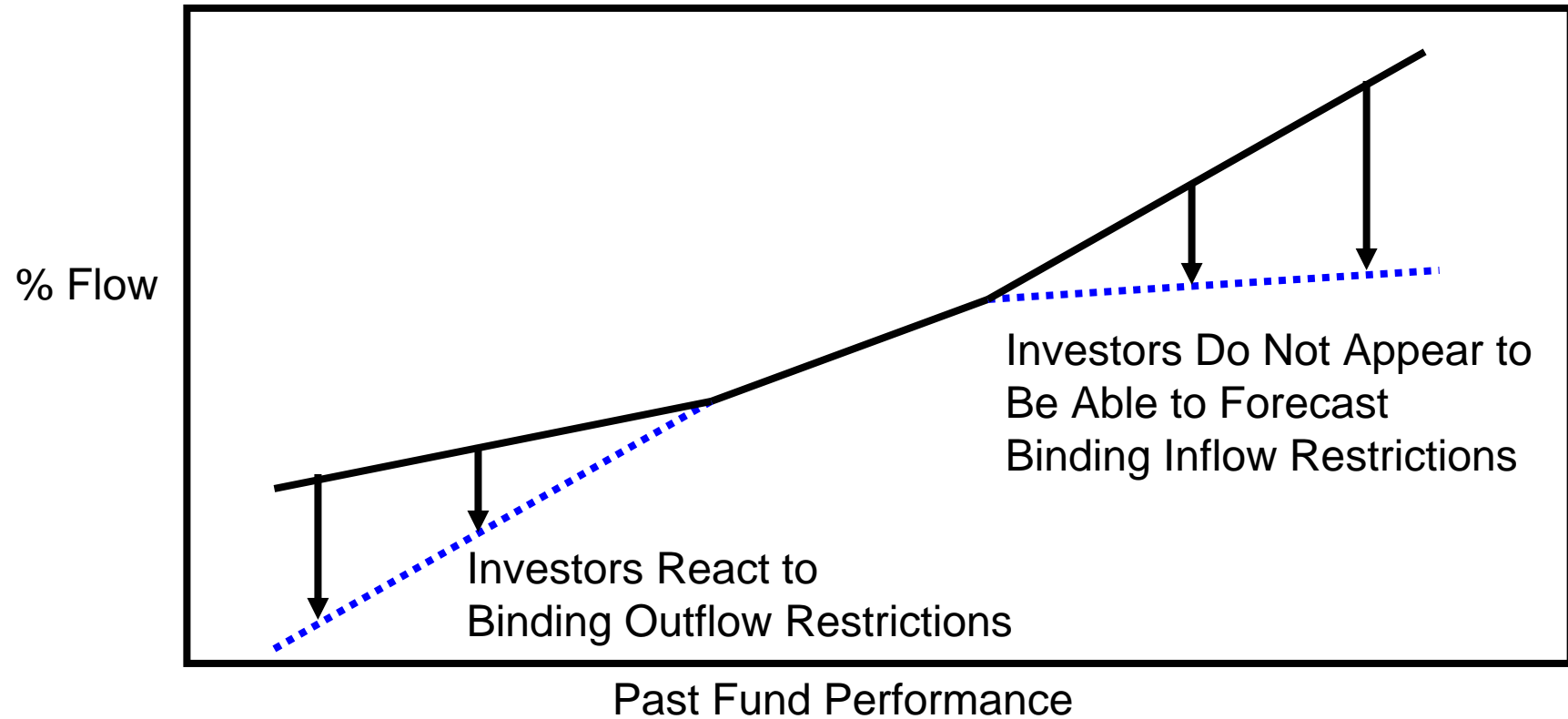
Table VI Long/Short Equity Hedge

Variable	All Estimate		Live Estimate		Defunct Estimate	
Intercept	3.580	***	4.346	***	3.493	**
Low Performance	0.196		-0.743		0.228	
Middle Performance	1.251	***	1.431	***	0.956	*
High Performance	1.496	**	1.451	*	1.849	***
Fund Character	Yes		Yes		Yes	
Obs.	274		201		73	
Adj. R^2	15.3%		15.12%		22.09%	

Table VII Live vs. Defunct

Variable	Live Estimate		Defunct Estimate	
Intercept	2.897	***	1.891	***
Low Performance	0.966	***	0.751	*
Middle Performance	0.928	***	0.694	***
High Performance	0.707	**	1.203	**
Fund Character	Yes		Yes	
Obs.	493		199	
Adj. R^2	13.56%		13.76%	

Table VIII Closed To Investment By Performance Group

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Panel A: 01/2001 Data											
High Closed %	20.59	35.90	22.06	26.47	18.27	20.33	18.87	17.62	16.75	15.38	18.28
Low/Med Closed %	11.67	10.98	25.77	19.48	18.53	14.64	15.45	18.83	19.08	19.78	18.89
Difference	8.92	24.92	-3.71	6.99	-0.26	5.69	3.42	-1.21	-2.33	-4.40	-0.61
Closed Avg. Rank	0.552	0.679	0.518	0.538	0.511	0.581	0.585	0.481	0.432	0.422	0.491
Open Avg. Rank	0.504	0.439	0.563	0.466	0.481	0.537	0.514	0.467	0.452	0.450	0.504
Difference	0.048	0.240	-0.045	0.072	0.030	0.044	0.071	0.014	-0.020	-0.028	-0.013
Closed Avg. Return	1.922	0.534	1.389	1.812	1.650	0.929	3.126	0.642	0.175	-0.098	1.516
Open Avg. Return	1.906	-0.154	1.718	1.480	1.453	0.459	2.523	0.578	0.401	-0.031	1.577
Difference	0.016	0.688	-0.329	0.332	0.197	0.470	0.603	0.064	-0.226	-0.067	-0.061
Panel B: 09/2005 Data											
High Closed %	11.11	25.00	16.67	17.72	16.95	20.55	17.77	23.51	22.95	25.12	15.65
Low/Med Closed %	12.00	14.06	19.79	16.55	16.00	15.69	17.40	16.63	16.67	14.31	16.49
Difference	-0.89	10.94	-3.12	1.17	0.95	4.86	0.37	6.88	6.28	10.81	-0.84
Closed Avg. Rank	0.634	0.651	0.496	0.543	0.568	0.547	0.553	0.590	0.597	0.607	0.522
Open Avg. Rank	0.543	0.540	0.559	0.534	0.530	0.511	0.525	0.539	0.531	0.507	0.519
Difference	0.091	0.111	-0.063	0.009	0.038	0.036	0.028	0.051	0.066	0.100	0.003
Closed Avg. Return	2.771	0.986	1.140	1.879	2.026	0.424	2.962	1.095	0.926	0.634	1.560
Open Avg. Return	2.287	0.436	1.706	1.760	1.587	0.288	2.134	1.040	0.837	0.328	1.597
Difference	0.484	0.550	-0.566	0.119	0.439	0.136	0.828	0.055	0.089	0.306	-0.037

Table IX Drop Reasons by Performance Groups

Drop Reasons	Low N	Low %	Middle N	Middle %	High N	High %
Closed to new $	1	0.6	0	0.2	1	0.55
Dormant	0	0.15	0	0.09	0	0.07
Merged	5	4.62	5	4.67	4	3.81
Liquidated	73	52.09	51	52.50	42	46.25
No longer reporting	41	28.50	30	30.13	33	35.67
Unable to contact	12	8.70	7	7.16	9	8.82
Unknown	6	5.33	5	5.25	5	4.83

Live vs. Defunct Funds

- **Live vs. Defunct Funds**

  Live funds: concave flow-performance relation due to voluntary closures of good performers (and involuntary closures of poor performers)

  Defunct funds: convex flow-performance relation due to different exit reasons:
  - well-performing funds attract substantial new investments before closing
  - poorly-performing funds liquidate

Table X Performance of Hedge Fund Flows

	GT(%)		FW zero-cost		EW zero-cost	
All Funds	0.35	**	0.79		1.17	
Convertible arb	0.11		1.28		1.64	
Short seller	0.01		-2.04		-1.37	
Emerging mkt	0.20		-2.69		0.64	
Equity mkt neutral	0.01		-0.45		0.56	
Event driven	0.15		-0.60		1.70	*
Fixed income arb	0.25	**	1.78		3.92	***
Global macro	0.06		-4.00		-0.95	
L/S equity hedge	0.43	*	4.88	**	2.34	**
Managed futures	-0.09		-0.41		-0.40	
Multi-strategy	0.59	***	3.26		6.81	**
Fund of funds	0.06		0.26		0.47	

Table XI Smart Money and Share Restrictions

	All Funds		High Liquidity		Low Liquidity	
Intercept	1.619	***	2.079	**	1.116	
Russell 3000	0.060	*	0.098	***	0.016	
LMS	-0.019		0.015		-0.042	*
VMG	0.012		0.025		-0.013	
UMD	0.037	***	0.032	**	0.030	**
Lehman Aggre. Bond	0.062		-0.004		0.057	
Credit Spread	-0.666	**	-1.018	**	-0.251	
Term spread	-0.139	*	-0.144	*	-0.176	
ATM Call	-0.002		-0.003	*	-0.002	
MSCI Emerging Stock	-0.042	***	-0.052	***	-0.045	***
MSCI Emerging Debt	-0.075		-0.044		0.054	
LIBOR	-2.389	**	-2.830	**	-1.996	
USD	-0.055		-0.027		0.022	
GOLD	-0.022		-0.003		-0.039	**
OIL	0.009		0.013		0.009	
Change in VIX	0.010		-0.014		0.036	
Adj. R^2	24%		27%		14%	

Conclusions

- Studied investor behavior through hedge fund flows
- Sensitivity of hedge fund flows to past returns differs from the sensitivity of mutual fund flows to past returns
- The flow performance relation is concave with share restrictions but convex without restrictions
- Sensitivity of fund flows to past returns greatly depends on Live vs. Graveyard database
- The shape of the flow-performance curve depends on
    - restrictions
    - live or defunct
- Strong evidence of the smart money on individual hedge fund level but reduced by share restrictions