Growing the asset management franchise: Evidence from hedge fund firms

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Abstract

We investigate the growth strategies of hedge fund firms. We find that firms with successful first funds are able to launch follow-on funds that charge higher performance fees, set more onerous redemption terms, and attract greater inflows. While first funds outperform follow-on funds, the superior performance of the former attenuates following the launch of the second fund. Multiple-product firms underperform single-product firms, but harvest greater fee revenues. Consequently, in an environment characterized by rising compliance costs and declining return expectations, the multiple-product firm has become the dominant business model in the hedge fund industry.

1. Introduction

During the nascent days of the hedge fund industry, circa early 1980s to mid 1990s, private investors with double digit return expectations were the main capital providers to the hedge fund industry. Hedge fund managers were perceived to be speculators taking unconventional, highly leveraged bets on currencies and commodities to enhance the performance of their funds.[1] The early successes in generating out-sized returns from alternative asset classes caught the attention of institutional investors who started allocating capital to hedge fund managers.[2] Their arrival accelerated after the collapse of the dot-com bubble at the turn of the century and institutional investors have grown to become the dominant investor clientele in the hedge fund industry. Post the 2008 financial crisis, the institutionalization of the industry significantly raised the importance of operational integrity.[3] Concomitantly, increased regulatory and compliance costs (which started post 9/11 and accelerated post the 2008 crisis), as well as heightened pressure on hedge fund fees, conspired to ratchet up the minimum critical mass needed for a hedge fund firm to sustain operations with management fee revenues.[4] Moreover, compressed return expectations and the low interest rate environment negatively impacted the relative attractiveness of uncertain performance fees compared to fixed management fee revenues, which further bolstered the case for asset growth. Recent academic work has emphasized the importance of asset growth in shaping the incentives of hedge fund managers (Lim, Sensoy, and Weisbach, 2016; Yin, 2016). Yet the question remains: faced with the afore-mentioned myriad of environmental challenges, how do hedge fund firms grow?

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[1] See Fung, Hsieh, and Tsatsaronis (2000).

[2] See Edelman, Fung, and Hsieh (2013), Table 1.

[3] See "Hedge funds must grapple with shifting balance of power," Financial Times, 25 August 2015, for a discussion on the institutionalization of the hedge fund industry.

[4] According to Troy Gayeski, partner at SkyBridge, a New York-based fund of funds, "Ten years ago a hedge fund with $50m of assets could generate plenty of revenue to cover overheads. These days it has to be $500m, and part of the reason is that regulatory requirements have gone up dramatically." See "Hedge funds move to family offices is not entirely popular," Financial Times, 23 October 2015. For a discussion on the heightened pressure on hedge fund fees see "Hedge funds cut fees to stem client exodus," Financial Times, 18 December 2015, and "Calpers to pare external managers," Wall Street Journal, 8 June 2015. The hedge fund industry has responded to increased regulations in Europe by launching UCITs funds, which could be marketed across Europe with minimal incremental compliance costs.

Our paper plugs this gap in the literature by focusing on the behaviour of hedge fund firms who have managed to create a track record and who now face a choice of growth strategy. Our empirical analysis starts with the observation that hedge fund firms often operate multiple funds, and not all funds managed by a hedge fund firm command the same regard from investors. Anecdotal evidence suggests that the reputation of a multiple fund firm rests heavily on the performance of its first fund.[5] In order to grow her business franchise beyond the first fund, a hedge fund manager faces two choices. She could (i) offer multiple funds or products, or (ii) simply grow the assets under management (henceforth AUM) of a single commingled fund or product. Which of these two options is the preferred one? Do hedge fund firms leverage off the stellar performance of their first funds to launch additional funds? If so, do managers deliver higher returns with the earlier funds launched than with the later funds launched by their firms since they are more motivated to establish a track record with the former? Are there blowback effects where the poor performance of follow-on funds adversely impacts the capital flows into the first fund? Do the capital raising activities of multiple product firms benefit investors? How do such activities impact the total fee revenue of the hedge fund firm? Do investors respond rationally to firms that launch multiple products?

Our results are striking. We find that hedge fund firms with successful first funds launch follow-on funds that charge higher performance fees, set more onerous redemption terms, and attract greater inflows. These effects prevail after controlling for the performance of the other follow-on funds launched by the same firm. Indeed, past first fund performance predicts future flows into follow-on funds over and above the explanatory power of past own fund performance. Thus, our empirical results suggest that there is a halo effect from a successful first fund and it is an important consideration to hedge fund managers in their capital raising campaigns.

In light of the positive spillover effects engendered by first funds, are managers incentivized to deliver better performance with the earlier funds launched by their firms? We find that first funds outperform follow-on funds by 2.51 percent per annum after adjusting for co-variation with the Fung and Hsieh (2004) seven factors and controlling for the other variables

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[5] For example, the Financial Times reported that Man Group's stock rose buoyed by the outperformance of its first fund, AHL. See "Man Group outperforms as first fund sparkles," Financial Times, 24 September 2011. Similarly, the Wall Street Journal reported that BlueCrest plans to stop managing money for outside clients after a run of poor returns and client redemptions from its first fund, BlueCrest Capital International. See "BlueCrest capital decides to go private," Wall Street Journal, 2 December 2015.

that can explain fund performance. The effect is statistically significant at the one percent level. Moreover, the difference between first and follow-on fund performance is even stronger for the follow-on funds that are launched later. The abnormal return spread between the first and the second to fifth fund launched is a statistically reliable but economically modest 1.26 percent, while the analogous spread between the first and the eleventh to twentieth fund launched is an impressive 3.45 percent per year. These findings cannot be explained by differences in fund age (Aggarwal and Jorion, 2010), size (Berk and Green, 2004), return smoothing behavior (Getmansky, Lo, and Makarov, 2004), fees (Agarwal, Daniel, and Naik, 2009), share restrictions and illiquidity (Aragon, 2007; Aragon and Strahan, 2012), and backfill and incubation bias (Liang, 2000; Bhardwaj, Gorton, and Rouwenhorst, 2014).

Do hedge fund investors benefit from the capital raising activities of multiple product firms? Empirical evidence shows that the outperformance of the first fund is driven by strong initial performance, which moderates after the launch of the first follow-on fund. Prior to follow-on fund launches, first funds of multiple product firms outperform first funds in other firms by 2.79 percent per year after adjusting for risk. However, upon the launch of the first follow-on fund, first funds' alpha deteriorates by 4.48 percent per year.[6] Consequently post follow-on fund launch, the average first fund's performance from multiple product firms reverts to the performance of their follow-on products. Instead of protecting the first fund's performance by limiting its AUM growth, multiple product firms typically grow AUM across all products, i.e., first as well as follow-on. This in part explains the performance deterioration of multiple product firms once they embark on an asset-gathering strategy.

A natural question arises as to why do hedge fund firms not protect their first fund's track record by limiting capital inflow so as to continue benefitting from the halo effect? There are two possibilities. First, in a low expected return environment, managers may prefer to gather assets and collect more fees now (or their competitors will). Second, managers may be concerned that if their follow-on funds do not perform well, there would be a blowback effect on the flows into the first fund. Therefore, they raise excess capital in their first funds to act as a buffer. We test

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[6] We also find that during the 36-month period prior to the launch of the first follow-on fund, 35.1 percent of the first funds delivered alpha. Over the same period, for randomly matched single product firms, a significantly lower fraction of funds, i.e., 23.6 percent, are alpha producing funds. During the 36-month period after the launch of the first follow-on fund, only 27.7 percent of the first funds and 29.6 percent of the first follow-on funds continue to deliver alpha.

for this possibility and find evidence of a significant blowback effect from follow-on funds to the first fund. Lower follow-on fund returns over the past one-, two-, and three-years are associated with lower flows into the first fund of the same hedge fund firm after controlling for past first fund returns. This blowback effect constrains the multiple product capital raising strategy and suggests that firms need to balance quantity with quality when embarking on such a growth path.

Is investors' confidence in firms with successful first funds completely misplaced? We find that hedge fund firms with successful first funds are not simply lucky. At the beginning of a hedge fund firm's capital raising campaign, stellar first fund performance is associated with better subsequent follow-on fund and first fund performance. We find that on average, a one percentage point increase in the first fund's monthly alpha in the 12-month period prior to the launch of the first follow-on fund precipitates a 10.4 basis point increase in follow-on fund monthly alpha, and a 15.1 basis point increase in the first fund monthly alpha, in the 12-month post launch period. Therefore, it seems that investors who subscribe to a new fund launched by a hedge fund manager with a stellar first fund are responding rationally to the positive outlook that such an event is signaling at the beginning of the firm's capital raising campaign.

Does said asset-gathering strategy lead to higher total fee income despite the potential loss of incentive fees? Portfolio sorts indicate that multiple product firms on average underperform single product firms by a statistically reliable 2.70 percent per annum after adjusting for risk. Yet, despite underperforming single product firms, multiple product firms are able to generate significantly greater total fee revenue than their single product counterparts. In particular, multiple product firms harvest fee revenues that are on average US$20.04 million per annum higher than that harvested by single product firms. The larger size of the multiple product firms explains some of the difference in fee revenue. However, even after controlling for size via a double sort, we find that multiple product firms dominate single product firms in terms of fee income. In line with the asset gathering view, we find that the increase in fee revenues in multiple product firms is driven more by management fees than by performance fees.

How have investors responded to this capital raising strategy? To answer this question we decompose our sample into have-alpha and beta-only firms.[7] We find that have-alpha firms capture the vast majority of inflows in the hedge fund industry attracting a statistically significant average inflow of 3.12 percent per annum while beta-only firms attract an average inflow of 0.84 percent per annum, which is statistically indistinguishable from zero. Moreover, most of the cumulative inflows accrue to multiple product have-alpha firms as opposed to single product have-alpha firms. These findings are consistent with the Berk and Green (2004) prediction that managers will continue to grow AUM until investors perceive that their ability to generate alpha is exhausted.[8]

The empirical results are consistent with hedge fund managers pursuing asset gathering as their growth strategy – a strategy that favors firms with operational scale. We argue that this in turn spurs the continuing concentration of the industry's AUM in the hands of mega hedge fund firms (Edelman, Fung, and Hsieh, 2013). Our findings suggest that hedge fund managers place much more emphasis on management fees as distinct from performance fees, which were commonly believed to be the dominant component of hedge fund managers' compensation. This is a significant departure from hedge fund manager behavior during the nascent days of the industry. We attribute this shift in manager preference to a number of environmental factors including the institutionalization of the industry, increased operational, compliance, and regulatory costs, as well as compressed return expectations.[9]

This paper resonates with the literature on the strategic behavior of mutual fund families (Nanda, Wang, and Zheng, 2004; Gaspar, Massa, and Matos, 2006). Our findings on intra-firm spillovers and the underperformance of multiple product firms echo those of Nanda, Wang, and Zheng (2004) who show that the presence of a star induces positive spillover effects on the other funds within the same mutual fund family and that the naïve strategy of chasing star families

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[7] Have-alpha firms are firms with Fung and Hsieh (2004) alphas, estimated over a 36-month rolling window, that are positive and statistically significant at the five percent level. All other firms are beta-only firms. Have-alpha funds and beta-only funds are defined in an analogous fashion.

[8] It is interesting to note that when one uses the hedge fund firm as a unit of analysis, the flow-performance relationship depicted in Berk and Green (2004) manifests itself as a halo effect in one direction and as a blowback effect in the reverse direction, in the case of multiple fund firms. This feature is missed by studies using an individual fund as a unit of analysis. Our findings extend the work of Edelman, Fung, and Hsieh (2013) by highlighting that their "mega" firms are in fact multiple product "mega" firms.

[9] It is well known that the performance fee is a free call option granted by the investors to the manager. Because of these environmental factors, the implicit cost of accessing that free call option seems to have gone up over time.

does not benefit investors. Unlike Nanda, Wang, and Zheng (2004), who focus on flows, we show that in the hedge fund space, intra-firm spillover effects extend beyond flows to include fees, redemption terms, and performance. Our results contribute to the literature on agency problems in the hedge fund industry, which finds that some hedge funds tend to misreport their returns (Bollen and Pool, 2008; 2009), delay reporting poor returns (Aragon and Nanda, 2016), and take on excessive liquidity risk (Teo, 2011).[10] Consistent with the agency view, we find that manager co-investment and better fund governance help ameliorate the asset gathering tendencies of hedge fund firms. We complement the literature on hedge fund incentives. Agarwal, Daniel, and Naik (2009) show that hedge funds that are operating closer to their high water marks outperform. Lim, Sensoy, and Weisbach (2016) argue that substantial indirect incentives exist in the hedge fund industry as good current performance precipitates increases in future inflows, leading to higher fee revenues. We add to this body of work by showing that the hedge fund compensation model incentivizes hedge fund firms to grow via the launch of multiple products.

Our work is most related to Kolokolova (2011) and Yin (2016). Kolokolova (2011) finds that hedge fund firms with high past returns are more likely to launch new funds and attract inflows. Unlike us, she does not differentiate between first and follow-on funds. We believe that focusing on first funds is critical as stellar first fund performance allows a firm to transition from a single product to a multiple product firm. Relative to Kolokolova (2011), we deepen our understanding of firm strategic behavior by documenting the impact of fund launch chronology on fund performance, showing that the intra-firm spillover effect extends beyond fund flow to encompass performance fees and redemption terms, and that multiple product firms garner more fee revenue even after controlling for firm size. Moreover, by finding evidence of intra-firm performance persistence and showing that investors gravitate towards have-alpha as opposed to beta-only multiple product firms, we resolve the conundrum raised by Kolokolova (2011) about the apparent irrationality of fund investors that respond to short-lived firm outperformance.

Yin (2016) argues that the hedge fund management compensation contract induces individual hedge funds to grow beyond that which is optimal for fund performance. While Yin

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[10] Bollen and Pool (2008, 2009) provide discontinuity around zero as evidence of misreporting of returns. However, recent work by Jorion and Schwarz (2013) suggests that this is caused by the incentive fee mechanism instead of misreporting.

(2016) focuses on the growth of the individual hedge fund, we focus on the growth of the hedge fund firm. Unlike us, Yin (2016) does not investigate intra-firm spillover effects from first funds to follow-on funds and vice-versa (i.e., the blowback effect), the relationship between fund launch chronology and performance, intra-firm fund performance persistence, or the prevalence of the multiple product firms within the hedge fund industry.[11] Our results suggest that stellar first fund performance not only allows first funds to grow capital beyond the optimal point, as in Yin (2016), but also allows their management company to do likewise via the launch of subsequent funds. Consequently, the indirect incentives facing hedge fund managers, especially those managing first funds, are likely to be even stronger those that suggested by Lim, Sensoy, and Weisbach (2016).

Furthermore, our work offers several methodological enhancements relative to the literature. First, we measure performance fee revenues precisely by accounting for capital flows in conjunction with net asset values in the determination of high water marks. By using only net asset values in the computation of performance fees, as in Yin (2016) and Kolokolova (2011), one consistently under-estimates fees when, for instance, there are fresh capital inflows during the recovery that follows a performance trough. Second, we adjust the yield spreads in the Fung and Hsieh (2004) model for duration so that the resultant bond factors represent true returns and are more appropriate for capturing risk. Lastly, we cater for the possibility that hedge funds change their fees over time. Using multiple fee snapshots to determine whether a fund has changed its fees over time, we find that, consistent with Agarwal and Ray (2011) and Deuskar et al. (2013), a non-trivial proportion (9.69 percent) of the funds in our sample experience fee changes at least once during our sample period. Our main findings, including those that pertain to fee revenues, prevail after excluding these funds from our sample.

The remainder of this paper is organized as follows: Section 2 describes the data and methodology. Section 3 reports the results from the empirical analysis while Section 4 presents a series of robustness tests. Section 5 concludes.

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[11] We note that Yin (2016) replicates our finding that first fund's performance deteriorates and assets under management continue to grow post launch of the first follow-on fund by the same firm, and references an earlier version of our paper in his introduction.

2.   Data and methodology

We evaluate hedge funds using monthly net-of-fee returns and AUM data of live and dead hedge funds reported in the TASS, HFR, and BarclayHedge datasets from January 1990 to December 2010.[12] Because TASS, HFR and BarclayHedge started distributing their data in 1994, the data sets do not contain information on funds that died before December 1993. This gives rise to survivorship bias. We mitigate this bias by focusing on data from January 1994 onward.

In our fund universe, we have a total of 18,348 hedge funds, of which 6,258 are live funds and 12,090 are dead funds. The funds are roughly evenly split between the three databases. While 2,676 funds appear in all three databases and 4,099 funds appear in two databases, many funds belong to only one database. Specifically, there are 3,365 funds, 3,750 funds, and 4,458 funds peculiar to the TASS, HFR, and BarclayHedge databases, respectively. This highlights the advantage of obtaining data from multiple sources. In our analysis, we focus on the sample of funds without duplicate share classes due to concerns that funds with multiple share classes could cloud the analysis.[13] Removing duplicate share classes from the sample leaves us with a total of 15,592 hedge funds, of which 4,988 are live funds and 10,604 are dead funds.

Other than monthly return and size information, our sample also captures data on fund characteristics such as management fee, performance fee, redemption frequency, notification period, and investment style. Following Agarwal, Daniel, and Naik (2009), we classify funds into four broad investment styles: Security Selection, Multi-process, Directional Trader, and Relative Value. Security Selection funds take long and short positions in undervalued and overvalued securities, respectively, and reduce systematic risks in the process. Usually, they take positions in equity markets. Multi-process funds employ multiple strategies that take advantage of opportunities created by significant transactional events, such as spin-offs, mergers and acquisitions, bankruptcy reorganizations, recapitalizations, and share buybacks. Directional Trader funds bet on the direction of market prices of currencies, commodities, equities, and bonds in the futures and cash market. Relative Value funds take positions on spread relations

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[12] The results are robust to using pre-fee returns.

[13] If a hedge fund firm has an onshore and offshore fund pair, we drop the offshore fund, essentially treating it like a duplicate share class. We also find that our baseline results do not change if we drop the onshore fund in those cases. Our findings are therefore not driven by differences between the onshore and offshore duplicate of the same fund (Aragon, Liang, and Park, 2014).

between prices of financial assets and aim to minimize market exposure.

We define first funds as the first fund launched by each hedge fund firm. Follow-on funds are the other funds launched by hedge fund firms. To determine fund status, we sort our sample of funds based on fund inception date within the firm. To ensure that there is only one first fund per firm, when more than one fund is launched on the same month by a firm, we merge them to form a composite fund and treat it as that firm's first fund.[14] The fund attributes and monthly returns of the composite fund are simply the average fund attribute and average monthly returns of its component funds, respectively. The monthly AUM of the composite fund is the sum of the monthly AUM of its component funds.

Table 1 breaks down the funds in the sample by investment strategy and reports the first and follow-on fund distribution as well as the number of live and dead funds in each strategy. To facilitate comparison with our overall fund sample, the first funds reported in Table 1 include all the component first funds launched by hedge fund firms. So, there are more first funds reported in Table 1 than there are firms. We note that there are 6,735 firms in our sample. When the component funds are grouped together to form composite funds so that each firm is linked to only one first fund, we find that there are 4,144 firms with only one fund, 2,205 firms with two to five funds, 261 firms with six to ten funds, 98 firms with 11 to 20 funds, and 27 firms with more than 20 funds. We note that the time between successive fund launches is a decreasing function of the number of funds already launched by the firm. For example, after conceiving the its first fund, it takes a firm 35 months on average to launch the second fund, another 25 months to launch the third fund, and another 21 months to launch the fourth fund.

[Insert Table 1 here]

Hedge fund data are susceptible to many biases (Liang, 2000; Fung and Hsieh, 2009). These biases stem from the fact that inclusion in hedge fund databases is voluntary. As a result,

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[14] Of the 6,735 firms in our sample, 5,994 have a single first component fund while only 741 have multiple first component funds. In other words, 89 percent of the firms in our sample started with only one fund. The average number of first component funds per firm is 1.135. In lieu of forming composite first funds, we cater for the possibility that firms may launch more than one fund in their first month in two alternative ways. First, we drop firms that have more than one first fund, i.e., firms that launched more than one fund during their first month. Second, for such firms, we consider the largest fund launched during the first month as the first fund (based on fund AUM for the launch month) and remove the other smaller fund or funds conceived during that month. Our baseline results remain qualitatively unchanged with these adjustments.

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there is a self-selection bias. For instance, funds often undergo an incubation period in which they rely on internal funding before seeking capital from outside investors. Incubated funds with successful track records then go on to list in various hedge fund databases while the unsuccessful funds do not, resulting in an incubation bias. Related to this, when a fund is listed on a database, it often includes data prior to the listing date. Again, because successful funds have a strong incentive to list and attract capital inflows, these backfilled returns tend to be higher than the non-backfilled returns. In the analysis that follows, we will repeat the tests after dropping the first 24 months of return data from each fund so as to ensure that the results are robust to backfill and incubation bias. To fully address concerns about backfill bias raised by Bhardwaj, Gorton, and Rouwenhorst (2014) and others, we also redo the tests after removing all return observations that have been backfilled prior to fund listing date, which necessitates that we confine the fund sample to databases with data on fund listing date, namely TASS and HFR.

Throughout this paper, we model the risks of hedge funds using the Fung and Hsieh (2004) seven-factor model. The Fung and Hsieh factors are the excess return on the Standard and Poor's (S&P) 500 index (*SNPMRF*); a small minus big factor (*SCMLC*) constructed as the difference between the Wilshire small and large capitalization stock indices; the yield spread of the US ten-year Treasury bond over the three-month Treasury bill, adjusted for duration of the ten-year bond (*BD10RET*); the change in the credit spread of Moody's BAA bond over the ten-year Treasury bond, also appropriately adjusted for duration (*BAAMTSY*); and the excess returns on portfolios of look back straddle options on currencies (*PTFSFX*), commodities (*PTFSCOM*), and bonds (*PTFSBD*), which are constructed to replicate the maximum possible return from trend following strategies (see Fung and Hsieh, 2001) on their respective underlying assets.[15] These seven factors have been shown by Fung and Hsieh (2004) to have considerable explanatory power on hedge fund returns.

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[15] The trend following factors can be downloaded from http://faculty.fuqua.duke.edu/~dah7/DataLibrary/TF-Fac.xls.

3. Empirical results

3.1. Tests of follow-on fund attributes and flows

Our first set of tests focuses on the incentives of hedge fund firms. Are hedge fund firms incentivized to deliver superior performance with their first funds? How does stellar first fund performance benefit the follow-on funds managed by the same firm? We explore these spillover effects by testing the attributes of as well as flows into follow-on funds, conditional on the performance of the first fund. Specifically, we estimate OLS regressions on the management fee, performance fee, redemption period, redemption notice period, and monthly inflows of follow-on funds with first fund performance as an independent variable. The regressions include controls for the performance of the other follow-on funds managed by the same family. The monthly inflow regression also include as controls past own fund monthly return to account for the effect of fund performance on future inflows. Therefore, the fund attribute and fund flow regressions can be expressed as

$$FUND\_ATTRIBUTE_i = a + bFIRSTRET_i + cNFIRSTRET_i + \sum_k d^k STYLEDUM_i^k + \varepsilon_i$$

(1)

$$FLOW_{im} = a + bFIRSTRET_{im-12,m-1} + cFUNDRET_{im-12,m-1} + dNFIRSTRET_{im-12,m-1} +$$
$$\sum_k e^k STYLEDUM_i^k + \varepsilon_{im}$$

(2)

where $FIRSTRET_{im-12,m-1}$ and $NFIRSTRET_{im-12,m-1}$ in Eq. (1) are the first and other follow-on fund monthly returns averaged over the last 12 months prior to the launch of fund i, respectively. $FUND\_ATTRIBUTE_i$ is either follow-on fund management fee in percentage, performance fee in percentage, redemption period in months, or redemption notice period in months, and $STYLEDUM_i^k$ is follow-on fund style dummy for style k. We assume that fund attributes are determined at fund launch. In Eq. (2), $FIRSTRET_{im-12,m-1}$ and $NFIRSTRET_{im-12,m-1}$ are the first and other follow-on fund monthly return averaged over the last 12 months, respectively. $FUNDRET_{im-12,m-1}$ is own fund monthly return averaged over the

last 12 months.[16] We also estimate variants of the Eq. (1) and Eq. (2) regressions where the independent variables are returns averaged over the last 24 months or 36 months.[17]

The results reported in Panels A to C of Table 2 indicate that stellar first fund performance confers a variety of benefits to the follow-on funds managed by the same firm. The coefficient estimates on *FIRSTRET* in the fund attribute regressions suggest that controlling for the performance of the other funds within the same firm, firms with stellar first funds are able to raise follow-on funds that charge higher performance fees as well as set longer redemption and notification periods. The impact of past first fund performance on follow-on fund redemption and notice periods are statistically significant at the five percent level regardless of whether we average first fund returns over the 12-, 24-, or 36-month period prior to the launch of the follow-on fund.[18] The impact on follow-on fund performance fee is even stronger and is statistically significant at the one percent level for all return horizons considered. The results are economically meaningful. For example, the coefficient estimate on the first fund return in the redemption period regression with returns averaged over the last 24 months indicates that a one percentage point improvement in monthly returns increases the redemption period by 3.85 business days. This represents a roughly 19 percent increase relative to a baseline redemption period of a month.

[Insert Table 2 here]

Excellent first fund performance also allows hedge fund firms to raise more capital for their follow-on funds. The coefficient estimates on *FIRSTRET* in the fund flow regressions

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[16] Our results are virtually identical when we include past monthly own fund flow in Eq. (2) as an additional control variable.

[17] There are concerns that funds may not diligently update their AUM numbers every month. Instead they may only do so once a quarter. Therefore, monthly fund flows computed from changes in monthly AUM may not be an accurate reflection of capital flows into a fund. To address this issue, we estimate variants of Eq. (2) based on quarterly flows. Specifically, we evaluate the explanatory power of first fund, other follow-on fund, and own fund returns on quarterly follow-on fund flows were the returns are averaged over the last two, four, and eight quarters. We find that inferences do not change with this alternative set up. The coefficient estimates on first fund returns over the last two quarters and four quarters are statistically significant at the 5 percent level while that on first fund returns over the last eight quarters is statistically significant at the 10 percent level.

[18] Our interpretation of the notification and redemption term as variables is different from the conventional contractual interpretation. These contractual terms are normally set over sparse and discrete values for accounting convenience. Here, we are more interested in the signal embedded in the acceptance of these terms from investors. All things being equal, the acceptance of extended notification and redemption terms signals investors' loyalty to the firms' products (funds). As such, it is more informative to depart from market convention and allow notification and redemption terms to be measured continuously.

indicate that controlling for own fund past return and the past performance of other follow-on funds within the same family, flows into follow-on funds are positively associated with the past performance of the first fund within the same family. The impact of first fund performance on follow-on fund flow is positive over all return horizons considered and statistically significant at the five percent level. Specifically, when the average monthly first fund return measured over the last 24 months increases by one percent, inflows into follow-on funds increase by 0.175 percent. We note however that the impact of first fund performance on follow-on fund flow is small especially when compared to the impact of own follow-on fund performance on follow-on fund flow. This suggests that the incentive for firms to protect their first funds' performance once follow-on funds have been launched may be relatively weak. Nonetheless, the fund attribute results indicate that hedge fund firms are incentivized to deliver stellar performance with their first funds so as to raise follow-on funds at favorable terms.[19] These results confirm that there is a halo effect from a successful first fund that is beneficial for a firm's subsequent capital raising campaign.

3.2. *Tests of first and follow-on fund performance*

To test whether the incentives to generate superior performance with first funds documented in the previous subsection impacts actual performance, we evaluate the performance of first funds relative to the performance of follow-on funds. We sort funds within each hedge fund firm into twenty portfolios based on fund inception date. The nth portfolio corresponds to the nth fund launched by the firm. The first portfolio is simply the first fund portfolio. The other portfolios are the follow-on fund portfolios sorted by launch date within the firm. Next, we average the returns of each portfolio across hedge fund firms and evaluate the performance of the first fund, the second to fifth funds launched, the sixth to tenth funds launched, and the eleventh to twentieth funds launched relative to the Fung and Hsieh (2004) seven-factor model. The second to fifth funds launched portfolio is simply the average of the second to fifth fund

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[19] Inferences do not change when we replicate the Table 2 tests using abnormal risk-adjusted returns instead of raw returns. There are concerns that investors may not react quickly to fund returns due to fund redemption restrictions. To address this concern, we construct an indicator variable *REDEMPTION* that takes a value of one when the redemption notice period exceeds 20 business days and takes a value of zero otherwise. Next, we re-estimate the fund flow regressions after including *REDEMPTION*, *REDEMPTION*FIRSTRET*, *REDEMPTION*FUNDRET*, and *REDEMPTION*NFIRSTRET* as additional independent variables. The interaction variables capture the impact of redemption notice period on the sensitivity of fund flows to past returns. Inferences do not change with this alternative regression specification.

inception portfolios. The other follow-on fund portfolios are defined analogously. Since there are relatively few firms that launch ten or more funds, the number of funds in these portfolios decreases as we go from the first fund portfolio to the eleventh to twentieth fund portfolio. On average, the first fund portfolio comprises 1,828 funds, the second to fifth fund portfolio covers 329 funds, the sixth to tenth fund portfolio encompasses 58 funds, and the eleventh to twentieth fund portfolio contains 14 funds.

The results from the fund inception date sort are reported in Panel A of Table 3. Clearly, first funds outperform follow-on funds. First funds deliver an average return of 7.26 percent per annum after adjusting for co-variation with the Fung and Hsieh (2004) factors, while the second to fifth funds launched deliver an average risk-adjusted return of 5.99 percent. The risk-adjusted spread between these two portfolios is statistically significant at the one percent level (*t*-statistic = 3.99) but economically modest at 1.26 percent per annum after adjusting for risk. The abnormal spread rises to a more impressive 3.45 percent per annum when we move from the second to fifth funds portfolio (i.e., portfolio B) to the eleventh to twentieth funds portfolio (i.e., portfolio D). These results suggest that the later funds launched by a hedge fund firm tend to underperform the earlier funds launched by the same firm.

Since hedge funds with investor capital below US$20m may not be relevant to large institutional investors, we also conduct the portfolio sort on the sample of hedge funds with at least US$20m of AUM. The results reported in Panel B of Table 3 indicate that our findings are not driven by the smallest funds in the sample. Given capacity constraints at the fund level, the annualized alphas of Portfolios A, B, C, and D shrink by on average 1.16 percent when we exclude the smaller funds from the analysis. Nonetheless, the spread between Portfolios A and D remains economically significant at 5.61 percent per annum (*t*-statistic = 4.92).

[Insert Table 3 and Figure 1 here]

Figure 1 complements the results from Panel A of Table 3. It illustrates the monthly cumulative average residuals (henceforth CARs) from the portfolio of first funds (portfolio A) and the portfolios of follow-on funds (portfolios B, C, and D). CAR is the cumulative difference between a portfolio's excess return and its factor loadings (estimated over the entire sample period) multiplied by the Fung and Hsieh (2004) risk factors. The CARs in Figure 1 indicate that

portfolio A consistently outperforms portfolios B, C, and D over the entire sample period and suggest that the outperformance of first funds relative to follow-on funds is not peculiar to a particular year.[20]

There are concerns that the portfolio sort results could be due to hedge fund self-selection biases, serial correlation in hedge fund returns induced by thin trading, or the imputation of fund fees. First funds could backfill or incubate their returns more than follow-on funds. Further, serial correlation in fund returns could arise from linear interpolation of prices for infrequently traded securities, the use of smoothed broker dealer quotes, or, in some cases, deliberate performance-smoothing behavior. This could inflate some of the test statistics that we use to make inferences from the sort results. Finally, first funds could charge lower fees and hence earn higher returns on a post-fee basis. To allay such concerns, we redo the portfolio sorts after adjusting for backfill and incubation bias by removing the first 24 months of return data for each fund, after unsmoothing fund returns using the algorithm of Getmansky, Lo, and Makarov (2004), and after adding back fees to form pre-fee returns. The results from these robustness tests are presented in Table 4 and indicate that the superior performance of the first fund portfolio is not driven by backfill and incubation bias, thin trading-induced serial correlation, or lower fees.

In response to concerns raised by Bhardwaj, Gorton, and Rouwenhorst (2014) and others, we conduct an additional test to verify that backfill bias is not driving our results. We confine the analysis to TASS and HFR funds for which we have the date that the fund listed on the databases (only TASS and HFR provide this information). Next, we redo the portfolio sorts for this subset of funds and for returns reported at or after the respective fund listing date. As there are not enough funds with returns post-listing in the cross-section during the earlier years, we perform the analysis for the period after 1996. Our inferences remain unchanged when we control for backfill bias in this fashion.

[Insert Tables 4 and 5 here]

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[20] A plot of the cumulative raw returns for the first and follow-on fund portfolios delivers similar results. The cumulative raw return plot is available upon request.

To further test the performance difference between first and follow-on funds, we estimate the following pooled OLS regression:

$$ALPHA_{im} = a + bFIRST_i + c\log(SIZE_{im-1}) + dFIRST_i * \log(SIZE_{im-1}) + eMGTFEE_i + fPERFFEE_i + gNOTICE_i + hAGE_{im} + \sum_k p^k STYLEDUM_i^k + \varepsilon_{im}$$

(3)

where *ALPHA* is fund monthly abnormal return after stripping away co-variation with the Fung and Hsieh (2004) seven factors, *FIRST* is an indicator variable that takes a value of one when a fund is a first fund and a value of zero otherwise, *SIZE* is fund monthly AUM in millions of US$, *MGTFEE* is fund management fee in percentage, *PERFFEE* is fund performance fee in percentage, *NOTICE* is fund redemption notification period in months, *AGE* is fund age in decades, and *STYLEDUM* is fund style dummy. The primary variable of interest is the coefficient estimate on *FIRST*, which provides an indication of the spread in risk-adjusted performance between first and follow-on funds. The log(*SIZE*) variable captures capacity constraints at the fund level (Berk and Green, 2004). We include the interaction between *FIRST* and log(*SIZE*) as an independent variable to allow for the possibility that first funds are more sensitive to capacity constraints than are follow-on funds. *MGTFEE* and *PERFFEE* capture the impact of fund incentives on managerial performance (Agarwal, Daniel, and Naik, 2009) while *NOTICE* caters for the view expounded by Aragon (2007) that funds with longer redemption notification periods take on more liquidity risk and therefore harvest greater returns. We include *AGE* as a response to the Aggarwal and Jorion (2010) finding that younger funds outperform older funds. To facilitate the estimation of fund alpha, we only include results for funds with at least 36 months of return data. We also estimate the analogous regression on raw monthly fund returns to ensure that our findings are not an artifact of the risk adjustment methodology.

The results from the cross-sectional regression analysis are reported in columns one and two of Table 5. They corroborate the findings of the portfolio sorts and indicate that first funds outperform follow-on funds. Specifically, the coefficient estimate on *FIRST* in the alpha regression reported in column two of Table 5 indicates that, controlling for other factors that could explain fund performance, first funds outperform follow-on funds by 2.51 percent per

annum after adjusting for risk. The coefficient estimates on the interaction variable confirm our prior intuition that first funds are more susceptible to capacity issues than are follow-on funds. Taken together, the coefficient estimates on the log(SIZE) variable and on the interaction variable imply that the impact of fund size on first fund alpha is 1.56 times that on follow-on fund alpha. The coefficient estimates on the other control variables accord with the extant literature. Higher-powered incentives or fees (Agarwal, Daniel and Naik, 2009) and longer redemption notice periods (Aragon, 2007) are associated with superior performance while fund age is linked to poorer performance (Aggarwal and Jorion, 2010). Inferences do not change when we estimate the regression on raw returns suggesting that our findings are not driven by our risk adjustment technology.

To check for robustness, we estimate Fama and MacBeth (1973) regressions in place of the OLS regressions. Specifically, first we run cross-sectional regressions for each month. Then, we report the time-series averages of the coefficient estimates, and use the time-series standard errors of the average slopes to draw inferences. The Fama and MacBeth regressions control for correlation in residuals across different funds within the same month. We compute the standard errors using the method of Newey and West (1987) with a three-month lag to adjust for dependence across time. The Fama and MacBeth (1973) results reported in columns three and four of Table 5 echo our previous findings and indicate that they are robust to alternative model specifications.

3.3. Tests of hedge fund firm performance

Do investors benefit when hedge fund firms deliver superior performance with their first funds and subsequently raise capital via follow-on funds? Conceivably, the superior performance of first funds may more than compensate for the inferior performance of the other funds launched by hedge fund firms. To investigate, every January 1st we sort firms into five portfolios based on the number of funds previously launched. The first portfolio consists of firms that have launched only one fund. The other firms are sorted equally into the other four portfolios. The post-formation returns on these five portfolios during the next 12 months are linked across years to form a single return series for each portfolio. We then evaluate the performance of the portfolios relative to the Fung and Hsieh (2004) model. The alpha of the spread between

portfolio 1 (firms with one fund) and portfolio 5 (firms with many funds) represents the dispersion in risk-adjusted returns across firms as a result of the variation in number of funds per firm launched. To calculate hedge fund firm returns, we weight all the funds with return observations within each firm by fund AUM.

The results from the hedge fund firm sort are reported in Panel A of Table 6. They indicate that the practice of generating superior first fund performance and raising capital via follow-on funds does not benefit fund investors. Firms managing many funds underperform firms managing one fund by 2.44 percent per annum. After adjusting for co-variation with the Fung and Hsieh (2004) factors, this spread rises to 2.70 percent per annum. Both the raw return and risk-adjusted return spreads are statistically significant at the one percent level. In addition, risk-adjusted returns decrease almost monotonically as we move from portfolio 1 to portfolio 5. In Panel B of Table 6, we report the results when we equal weight funds to obtain firm returns. They indicate that our findings are robust to varying the way we weight fund returns. Figure 2 illustrates the findings from Panel A of Table 6. It plots the CARs from the portfolio of firms with one fund (portfolio 1) and the portfolio of firms with many funds (portfolio 5). The CARs in Figure 2 indicate that portfolio 1 consistently outperforms portfolio 5 over the entire sample period, suggesting that the outperformance of firms with few funds relative to firms with many funds is not confined to a particular sub-period.

[Insert Table 6 and Figure 2 here]

The results in Table 6 are consistent with the asset gathering view where hedge fund firms with successful first funds take advantage of their stellar track records and raise follow-on funds that subsequently underperform. The asset gathering view further predicts that in order to grow capital aggressively, firms will offer multiple products *and* multiple strategies so as to cater to heterogeneity in investor investment style preference as well as the preference for diversification. To test this view, we perform a three-by-three sort where we sort our sample of firms based on the number of funds launched and on the number of investment strategies offered. We find consistent with the asset gathering view that the Table 6 spread is greatest for firms that offer many investment strategies. Specifically, the annualized alpha spread between firms that offer few funds and those that offer many funds is 6.03 percent (*t*-statistic = 10.87) for firms in the top tercile in terms of number of investment strategies offered but only -0.15 percent (*t*-

statistic = −0.19) for firms in the bottom tercile in terms of the number of investment strategies employed.

3.4. Tests of hedge fund firm total fee revenue

How does raising multiple funds affect the total fee revenue that accrues to the firm management company? By launching multiple funds, hedge fund firms can raise additional capital while delaying the impact of fund-level capacity constraints. Moreover, the total fee revenues accruing to multiple product firms benefit from the non-netting of gains and losses across the separate funds housed within the same firm. However, as shown in the previous section, multiple product firms underperform single product firms by a significant margin. Therefore, it is not clear ex-ante that such an organizational strategy is necessarily helpful to firm revenue.

To investigate, we sort firms into five portfolios based on the number of funds launched as in Table 6. Next, we evaluate the total firm fee revenue (management fee plus performance fee) over the subsequent one-year period. Fund performance fee is calculated based on the assumptions outlined in Appendix A of Agarwal, Daniel, and Naik (2009) and after accounting for the high water mark feature in hedge fund incentive fee contracts. The results in the leftmost column of Panel A Table 7 suggest that hedge fund management companies benefit significantly from launching multiple funds or products. The average multiple product firm harvests an annual fee revenue of US$22.26 million, which is US$20.04 million greater than that harvested by the average single product firm. The greater AUM of the multiple product firms drives some of the fee revenue difference. On average, firms in portfolio 5 (firms with many funds) manage US$829.29 million, while firms in portfolio 1 (firms with one fund) manage only US$64.91 million. However, when we control for firm AUM in a double sort (see the rightmost columns of Panel A Table 7), we find that multiple product firms within each firm AUM quintile still harvest greater fee income than do single product firms within the same firm AUM quintile. The difference in fee revenue between multiple and single product firms is positive across all AUM quintiles and is statistically significant at the five percent level for three of the five AUM quintiles. These findings indicate that hedge fund firms are highly incentivized to launch multiple products so as to maximize fee revenue.

In Panel B of Table 7, we also report the proportion of total fee revenue that is driven by the management fee. We find, in line with the asset gathering view, relative to single product firms, the fee revenue for multiple product firms is driven more by the management fee. Specifically, for multiple product firms, 50 percent of the total fee revenue is derived from the management fee. For single product firms, the management fee drives only 45 percent of the total fee revenue. When we control for firm AUM using a double sort, we find that relative to single product firms, multiple product firms still derive a greater proportion of their total revenue from fixed fees for all firm AUM quintiles. Moreover, the differences in proportion are also statistically significant at the five percent level across all quintiles.

[Insert Table 7 here]

3.5. Tests of first fund performance around subsequent fund launch

Do firms protect the performance of their first funds while simultaneously operating other follow-on funds? To investigate, we first plot the monthly returns of the average first fund 36 months before to 36 months after the launch of the first follow-on fund by the same firm. To accommodate the 36-month window, the fund sample we analyze only includes first funds whose firms raised a subsequent fund between January 1997 and December 2007. The resultant graph in Figure 3 suggests that first fund performance deteriorates once the firm launches a subsequent fund. The average annual first fund return prior to the follow-on fund launch is 17.46 percent, while the analogous return after the follow-on fund launch is 10.21 percent. This implies that first fund performance deteriorates by 7.25 percent once the firm launches another fund.[21] In Figure 3, we also plot the AUM of the average first fund over the same event window. We find that despite the dramatic deterioration in first fund performance, the average first fund is able to increase its AUM by 113 percent in the 36-month period after the launch of the first follow-on fund by the same firm. This represents a substantial increase in AUM growth from just 27 percent over the 36-month period prior to the launch. The first fund returns and AUM depicted in

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[21] The difference is statistically significant at the one percent level (t-statistic = 12.30). The spread is not driven by a wave of hedge fund firms spawning new funds following a good year for the hedge fund industry. We repeat the analysis using hedge fund returns after subtracting away the average return of all the hedge funds in the database. We find that the average industry-adjusted first fund return is 5.96 and 0.37 percent per year before and after the launch of the first follow-on fund, respectively. The industry-adjusted return difference is statistically significant at the one percent level (t-statistic = 9.52).

Figure 3 suggest that following a bout of stellar performance at their first funds, hedge fund firms aggressively raise capital by launching new funds and marketing the first funds to investors. The resultant increase in AUM at the first funds may explain, at least in part, their subsequent underperformance.

[Insert Table 8 and Figure 3 here]

To investigate further, every month we sort first funds managed by firms that will launch or have launched subsequent funds into two portfolios based on whether the first follow-on fund has been launched. We then estimate the performance of those first fund portfolios relative to the Fung and Hsieh (2004) seven-factor model and report the results in Panel A of Table 8. The estimates in Table 8 indicate that first funds on average deliver an alpha of 9.77 percent per year before the launch of the first follow-on fund but only produce an alpha of 5.29 percent per year after the launch. This suggests that first funds risk-adjusted performance wanes post follow-on fund launch by 4.48 percent per year, which is statistically significant at the one percent level (*t*-statistic = 10.35). In addition, we show in Table 8 that first funds in firms that will launch other funds outperform other first funds managed by firms that will not conceive other funds (at least during our sample period) by a risk-adjusted 2.79 percent per year. Post launch, however, the former first funds underperform the latter first funds by a risk-adjusted 1.70 percent per year (see spreads A-D and B-D). Also, first funds in firms that have launched other funds do not outperform the first follow-on funds (see spread B-C). The last result suggests that firms do not protect the performance of first funds that are managed side-by-side other follow-on funds.

To test whether the drop in first funds performance can be explained by the increase in AUM of the first fund post launch of the first follow-on fund, we estimate OLS regressions on monthly fund alpha analogous to that in Eq. (3) but with *FIRST_PRELAUNCH* as an additional independent variable. The indicator variable *FIRST_PRELAUNCH* takes a value of one if the fund is the first fund managed by a firm and the firm will but has yet to launch another fund, and a value of zero, otherwise. In results that are available upon request, we find that the outperformance of the first fund is largely confined to the period prior to the launch of the subsequent fund by the same firm. The coefficient estimate on *FIRST_PRELAUNCH* is large and statistically significant at the one percent level. It suggests that after adjusting for other factors that explain fund performance, first fund abnormal returns decrease by 4.42 percent per year

after the launch of follow-on funds.[22] By contrast, the coefficient estimate on *FIRST* is much smaller but nonetheless still statistically significant at the one percent level. It indicates that first funds outperform follow-on funds by 1.82 percent per year on a risk-adjusted basis even after the launch of the subsequent fund by the same firm. Since we control for the log of monthly AUM in these regressions, the coefficient estimate on *FIRST_PRELAUNCH* suggests that while the greater AUM of first funds post launch of follow-on funds may erode performance, it does not completely explain the decline in first fund performance.[23] On balance, the findings indicate that hedge fund firms take advantage of stellar first fund performance to raise capital by growing the first fund and by launching new funds. In turn, such capital-raising activities hurt the performance of the first fund. These results also nicely explain why we find in Table 6 that firms managing many funds underperform firms managing just one fund.

3.6. *Intra-firm persistence in fund performance*

A deeper question is whether firms whose first funds delivered stellar performance did so because they were lucky or because they had skilled investment professionals on board. One view is that these firms where simply taking advantage of their good fortune by growing capital aggressively in the wake of a successful but lucky run at the first fund. However, that view necessarily calls into question the rationality of hedge fund investors who subscribed to the first and follow-on funds launched by such firms.

To investigate, we test the relationship between first fund performance prior to the launch of the first follow-on fund and the performance of the follow-on fund post inception. Specifically, we estimate the following regression on follow-on fund performance:

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[22] Inferences do not change when we control for backfill and incubation biases. After removing the first 24 months of returns from each fund, we find that first fund alpha shrinks by a statistically reliable 2.79 percent per year after the launch of the first follow-on fund by the same firm.

[23] We believe there are two possible explanations for the drop in first fund performance. First, firm partners at first funds that launch other funds may be too busy raising capital to devote much of their time to driving the investment process at the first fund. Second, firm partners may be less incentivized to deliver superior performance with the first fund now that they have raised enough capital to achieve critical mass at the firm level.

$$NFIRSTALPHA_{im,m+11}$$

$$= a + bFIRSTALPHA_{im-12,m-1} + cLog(NFIRSTSIZE_{im})$$

$$+ dNFIRSTMGTFEE_{im} + eNFIRSTPERFFEE_{im} + fNFIRSTNOTICE_{im}$$

$$+ \sum_{k} g^k STYLEDUM_i^k + \varepsilon_i$$

(4)

where m is the inception month, $NFIRSTALPHA_{im,m+11}$ is the follow-on fund abnormal return measured relative to the Fung and Hsieh (2004) seven-factor model averaged over the 12-month post-inception period, $FIRSTALPHA_{im-12,m-1}$ is the first fund abnormal return measured relative to the Fung and Hsieh (2004) seven-factor model averaged over the 12-month pre-inception period, $NFIRSTSIZE_{im}$ is follow-on fund size in US\$m at fund inception, $NFIRSTMGTFEE_{im}$ is follow-on fund management fee in percentage, $NFIRSTPERFFEE_{im}$ is follow-on fund performance fee in percentage, $NFIRSTNOTICE_{im}$ is follow-on fund redemption notification period in months, and $STYLEDUM_i^k$ is follow-on fund style dummy for style k. We estimate the univariate version of the regression as well as two other versions where first and follow-on fund returns are averaged over six and 24 months instead of over 12 months. Finally, we also examine the relationship between follow-on and first fund raw returns using an analogous regression framework.

The results reported in Table 9 suggest that the investment managers at hedge fund firms do possess investment skills. Fund risk-adjusted performance persists within hedge fund firms. A one percentage point increase in first fund monthly alpha in the 12-month period prior to the launch of the first follow-on fund is associated with a 10.4 basis point increase in follow-on fund monthly alpha in the 12-month post launch period that is statistically significant at the 5 percent level. One caveat is that after controlling for other variables that can explain follow-on fund performance, the coefficient estimate on first fund alpha increases slightly to 10.8 basis points but is only statistically significant at the ten percent level. Similarly, the coefficient estimates on first fund 12-month returns are statistically significant at the five and ten percent level, respectively, in the univariate and multivariate regressions. The multivariate results when hedge fund performance is averaged over the past six months are stronger while those averaged over the last 24 months are weaker.

In Table 10, we show that first fund performance persists around the launch of the first follow-on fund as well. A one percentage point increase in first fund monthly alpha in the 12-month period prior to follow-on fund launch is associated with an 15.1 basis point increase in first fund monthly alpha in the 12-month period post follow-on fund launch. The effect is stronger than the fund return spillover effect documented above, is statistically significant at the one percent level (*t*-statistic = 3.20), and prevails after controlling for the other factors that explain fund performance. Therefore, firms with stellar first fund performance were not simply lucky. Investors who subscribe to the first and follow-on funds managed by such firms are rationally responding to the view that they employ talented investment professionals.

3.7. Have-alpha and beta-only firms

The results from Table 7 indicate that multiple fund firms garner most of the capital in the hedge fund industry. Moreover, the findings in Table 8 suggest that firms that eventually go on to raise multiple funds initially outperform other single-fund firms but subsequently underperform single fund firms once they launch their second fund. Take together these findings suggest that the Berk and Green (2004) rational model of active management applies to the hedge fund industry as well.

To dig deeper, we adopt the methodology of Fung et al. (2008) and classify firms, on a rolling basis, into have-alpha and beta-only firms. A have-alpha firm is a hedge fund firm that has a positive and statistically significant (at the five percent level) Fung and Hsieh (2004) alpha measured over the last 36 months. All other firms are beta-only firms. Next, we calculate the average monthly net inflows into have-alpha and beta-only firms. We find in results available upon request that consistent with Berk and Green (2004), have-alpha firms attract the majority of flows in the hedge fund industry. Specifically, when we value-weight flows across firms, have-alpha firms attract a statistically significant (at the one percent level) average inflow of 3.12 percent per annum while beta-only firms only attract an average inflow of 0.84 percent per annum that is statistically indistinguishable from zero (at the five percent level). Figure 4 illustrates the cumulative firm flows into multiple fund versus single fund firms and have-alpha versus beta-only firms. It indicates that the cumulative inflows accrue more to multiple product

have-alpha firms than to single product have-alpha firms, suggesting that the multiple product structure is helpful in a firm's campaign to grow capital.

[Insert Figure 4 and Table 11 here]

How prevalent is this business model among hedge fund firms? To investigate, we report in Table 11 firms sorted into deciles by firm AUM. Fung et al. (2008) observe a shift in the investor clientele towards institutional investors post the dot-com bubble around 2001. Combining this observation with our use of a 36-month regression window to compute alpha leads us to focus on the latter sample period 2005 to 2010. At the end of 2005, multiple product firms collectively manage 85.85 percent of our sample's total AUM rising to 90.02 percent by the end of 2010.[24] This has been a stable, informative time series confirming that the multiple product firm is the dominant business model used by hedge fund firms. Similar to Edelman, Fung, and Hsieh (2013), we find that a majority of the AUM in our sample is managed by firms in the largest AUM decile—ranging from 67.49 percent in 2005 to 75.55 percent by the end of 2010 with very little year-on-year variation. Among the firms in the largest AUM decile, on average 90.34 percent are multiple product firms managing 94.45 percent of the assets that are invested in the largest AUM decile firms. We refer to these as the largest-ten percent multiple product firms.

Do the growth paths of these large multiple product firms conform to our theory? Do investors react to have-alpha versus beta-only large multiple product firms differently? Dividing the largest-ten percent multiple product firms into have-alpha and beta-only, we find that over the 2005-2010 period, on average, 94.31 percent of the set of largest-ten percent multiple product have-alpha firms operate a first fund that had or currently have alpha. For the beta-only firms in this set of multiple product firms, 76.01 percent manage a first fund that had or currently have alpha. These results confirm that a majority of the assets invested in the hedge fund industry is managed by multiple product firms that have adopted a similar AUM growth strategy of establishing a successful first fund to help launch the subsequent capital raising campaign.

Next, we examine how the alpha of the firm deteriorates when firms launch additional funds. We find that during the 36-month period prior to the launch of the first follow-on fund,

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[24] The low over this period occurred at the end of 2005 and the high occurred at the end of 2010.

35.1 percent of the first funds are have-alpha funds.[25] Yet during the 36-month period after the launch of the first follow-on funds, only 27.7 percent of the first funds and 29.6 percent of the first follow-on funds are have-alpha funds.[26] These findings echo those of Table 8 and suggest that for multiple product firms, there is a significant deterioration in the fraction of first funds that deliver alpha once they launch their first follow-on fund, and the performance of their first funds start resembling that of their first follow-on funds. Taken together, our findings dovetail with the Berk and Green (2004) view that skilled managers will grow their businesses until their ability to generate alpha is exhausted, or is at least significantly compromised.[27]

3.8. Blowback effect

The results from the previous subsections suggest that there are constraints on the amount of capital that hedge fund firms can raise by adopting a multiple product growth strategy. To explore how these constraints play out on an intra-firm basis, we ask whether there is evidence of a blowback effect from follow-on funds to first funds. In that effort, we estimate the following regression on first fund flows:

$$FLOW_{im} = a + bFUNDRET_{im-12,m-1} + cNFIRSTRET_{im-12,m-1} + \sum_k d^k STYLEDUM_i^k + \varepsilon_{im}$$

(6)

where $FLOW_{im}$ is flow into first fund i on month m, $FUNDRET_{im-12,m-1}$ is first fund i return over the last 12 months prior to month m, $NFIRSTRET_{im-12,m-1}$ is follow-on fund return over the last 12 months prior to month m averaged across all follow-on funds managed by the same firm that launched fund i, and $STYLEDUM_i^k$ is first fund i style dummy for style k. We also

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[25] Over the same period, for randomly matched single-fund firms, a significantly lower fraction of funds, i.e., 23.6 percent, are have-alpha funds.

[26] The 35.1 percent fraction is statistically greater at the five percent level than both the 27.7 percent and the 29.6 percent numbers.

[27] Rational models of active management like Berk and Green (2004) assume an increasing and convex cost function which eats up the alpha as size increases. The reality is clearly more complex than that. For managers of smallish funds, spending time with potential investors diverts limited time away from investment decisions. These marketing distractions cost performance, much more so than the nickels and dimes of commissions. In contrast, managers of largish funds enjoy the benefits of being in deal-flow (both from the sell-side of the Street as well as from their peers) while staying on the right side of the law. This has been one of the motivations for the emergence of "activist" hedge funds on the positive side and the dreadful "side pockets" when the financial crisis of 2008 came along on the negative side. Finally, some costs are borne by the management company, while others are charged to the fund. Although investors may care more about the latter, arguably they also care about the former as these costs impact the viability of the firm as a business and its ability to exploit alpha opportunities.

estimate variants of the Eq. (6) regression where the independent variables are returns averaged over the last 24 months or 36 months. The results reported in Table 12 indicate that there is a significant blowback effect from follow-on funds to first funds. Poor follow-on past returns are a reliable harbinger of lower flows into first funds. The impact of follow-on fund returns is statistically significant over all return horizons considered even after controlling for own fund past returns. Moreover the impact of follow-on fund returns is economically significant. Panel A of Table 12 indicates that for returns evaluated over the last 12 months, it is about half as large as the impact of first fund returns on first fund flow. These results suggest that investors rationally impose constraints on the ability of hedge fund firms to grow via the launch of multiple products. Firms that embark on this strategy will need to balance quantity with quality when launching new funds.

[Insert Table 12 here]

4. Robustness tests

In this section, we present a battery of robustness tests to ascertain the strength of our empirical results.

4.1. *Dynamic risk exposures*

One concern is that the beta loadings of the fund portfolios might not stay constant over time. As a result, the risk-adjustment for, say, Tables 3 and 6 might not be accurate. To account for dynamic factor loadings, we impose structural breaks for August 1998 (LTCM crisis and Russian ruble default) and September 2008 (collapse of Lehman Brothers and the height of the 2008 financial crisis), and redo the Table 3 and 6 analyses. Another way to account for dynamic risk exposures is to calculate the factor loadings using a rolling 36-month window and use those factor loadings to calculate abnormal returns one month forward. The results from the structural break adjustment and risk exposures calculated using the rolling window approach are presented in Panels A and B of Table 13, respectively. They indicate that our findings are robust to catering for dynamic risk exposures.

[Insert Table 13 here]

4.2. Additional risk factors

The presence of additional risk factors could cloud the portfolio sort analyses. Relative to follow-on funds, first funds could be loading up more on some risk factor (e.g., emerging markets) that did well over the sample period. This could explain why there is a return spread between first and follow-on funds. Hence, we augment the Fung and Hsieh (2004) model with an emerging markets factor derived from the MSCI Emerging Markets Index return and redo the sorts for Table 3 and Panel A of Table 6. To cater for hedge fund exposure to option based strategies (Mitchell and Pulvino, 2001), we also augment the Fung and Hsieh (2004) model with out-of-the-money S&P 500 call and put option-based factors from the Agarwal and Naik (2004) model.[28] Finally, to account for hedge fund exposure to liquidity risk (Teo, 2011; Aragon and Strahan, 2012; Sadka, 2012), we augment the Fung and Hsieh model with the Pástor and Stambaugh (2003) liquidity factor. The results presented in Panels C to E of Table 13 indicate that our baseline findings are not driven by the presence of omitted risk factors.[29]

4.3. Fund termination

There are concerns that because funds that drop out from the database could have terminated their operations, the portfolio alphas are biased upward. To allay such concerns, we assume that, for the month after a fund drops out of the database, its return is -10 percent. Thereafter, money is reallocated to the remaining funds in the portfolio. As shown in Panel F of Table 13, with that adjustment for fund termination, the alphas of the portfolios in our Table 3 and 6 sorts fall but the spreads remain economically and statistically significant.[30] We also experimented with more extreme termination returns of -20 percent and -30 percent, and obtain qualitatively similar results. These findings suggest that the baseline results are robust to the self-reporting and delisting biases inherent in hedge fund data.

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[28] We are grateful to Vikas Agarwal for supplying these factors. Since they are only available up to August 2009, we conduct the sorts with the out-of-the-money factors for the period from January 1994 to August 2009.

[29] Inferences do not change when we augment the Fung and Hsieh model with emerging markets factor, the OTM call and put option based factors, and the Pástor and Stambaugh (2003) liquidity factor, and use the resultant 11-factor model to adjust for risk exposure in our portfolio sorts.

[30] To value weight the returns of funds within the hedge fund firm and compute firm returns, we assume that the fund termination AUM is the same as the AUM of the month just prior to fund termination.

4.4. Style-adjusted returns

In the paper, we adjust for investment style returns by including investment style fixed effects in all the regressions that we estimate. To further account for investment style performance, we compute style-adjusted returns for each fund. Style-adjusted return is simply the difference between fund return and the equal weighted average of the returns of all funds belonging to that fund's style for that month. Next, we perform our baseline portfolio sorts on fund style-adjusted returns. The results reported in Panel G of Table 13 indicate that the spreads from the sorts on fund inception and on the number of funds launched are still economically meaningful and statistically reliable after adjusting for style performance.

4.5. Out-of-sample test

To mitigate concerns that our findings may be driven by data snooping biases, we perform the baseline portfolio sorts on hedge fund data from Eurekahedge, a global hedge fund database. At the end of 2010, there are 9,403 funds in the Eurekahedge database, of which 5,661 are live and 3,742 are dead. These funds belong to 3,601 distinct hedge fund firms. When funds within each firm that are launched during the same month are grouped together to form composite funds, we find that there are 2,169 firms with only one fund, 1,240 firms with two to five funds, and 192 firms with more than five funds. Constrained by the smaller sample, we re-do the sorts in Table 3 focusing on the difference between portfolio A (first funds) and portfolio B (second to fifth fund launched). As shown in Panel H of Table 13, both the spreads for the sort on fund chronology and the sort on the number of funds launched survive the out-of-sample test.

4.6. Fund operational risk

Multiple product funds may be operationally more robust than single product funds. Consequently, they are able to raise more capital despite their underperformance. To investigate, we explore the relationship between fund survivorship and the number of funds conceived by a firm. Specifically, we estimate logit regressions on indicator variables for fund termination, *TERMINATION_1* and *TERMINATION_2*. *TERMINATION_1* assumes that all funds that stopped reporting to the databases also terminated their operations. *TERMINATION_2* assumes that of the funds that stopped reporting to the databases, only those that reported negative returns

for each of the three months prior to dropping out have terminated their operations. The independent variable of interest is *N_FUNDS* which is the number of funds conceived by a hedge fund firm prior to year *t*. Our regressions include controls for average monthly fund returns over the past year, fund management fee, performance fee, redemption notification period, age, size, and investment style. The results, which are available upon request, indicate that hedge funds belonging to multiple product firms are more likely to terminate their operations than funds belonging to single product firms. These results are not in keeping with the view that funds managed by multiple product firms are operationally more robust than other funds. Rather, they are consistent with the view that multiple product firms that manage many funds can afford to be more opportunistic, given that the reputation cost from the termination of a single hedge fund is likely to be lower for these firms. Therefore, these firms are more likely to wind down funds that have underperformed.

4.7. *Manager personal capital*

The investment of personal capital by hedge fund managers, often referred to as co-investing for short, can help to ameliorate the agency problems at hedge fund firms. To investigate, we redo the baseline fund chronology sort for funds with and without co-investing. This analysis is possible only for TASS funds since only TASS provides a co-investing indicator. Consistent with the agency view, fund managers are more likely to co-invest in their first funds than in their follow-on funds. We find that hedge fund managers co-invest in 42.36 percent of first funds versus only 27.43 percent of follow-on funds. Moreover, we find that for firms where the manager co-invests, the annualized alpha spread between the first fund launched and the 11th-20th funds launched is 3.59 percent and statistically indistinguishable from zero at the five percent level. In contrast, for those firms without co-investing, this spread is wider at 4.86 percent and statistically significant at the one percent level. Taking these results together, the absence of co-investing is indicative of managers pursuing a less performance sensitive, asset gathering growth strategy, whereas co-investing is consistent with the manager pursuing a more performance oriented growth strategy.

4.8.   Fund governance

Better fund governance may help ameliorate some of the agency problems that we uncover. To investigate, we construct the Ozik and Sadka (2016) governance measure from the fund information that we have at the end of the sample. The governance measure is based on whether a fund is an onshore fund, features a high watermark, registered with the SEC, was audited in the past, and employs a top auditor or a top legal counsel.[31] We are able to compute the measure for HFR and TASS funds only as BarclayHedge does not provide legal counsel information. We define as funds with strong governance, those with scores at or above four out of five and as funds with poor governance, those with scores at or below two out of five. Next, we redo our fund chronology sort. We find that the annualized alpha spread between the first funds and the 11th to 20th funds launched is wider for poor governance funds than for strong governance funds (5.24 percent versus 4.16 percent). These results are supportive of the view that fund governance is helpful in mitigating agency problems.

4.9.   Fund fee changes

Deuskar et al. (2013) find considerable fee changes in their sample of hedge funds. In our paper, we cull fund fee information from end-of-sample snapshots from TASS, HFR, and BarclayHedge, and assume that fees are constant over time. If hedge fund firms that launch follow-on funds are also more likely to raise their fees on existing funds over time, then we are likely to over-estimate the fee revenues from multiple product firms. To alleviate concerns that our findings are driven by fund fee changes, we gather multiple snapshots of TASS, HFR, and BarclayHedge. Specifically, we use nine snapshots of TASS, ten snapshots of HFR, and four snapshots of BarclayHedge to determine if a fund changes fees. If a hedge fund fees (either management or performance fee) differs for any two successive snapshots from the same database vendor for any vendor, we classify it as a fund that changed its fees during its lifetime.

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[31] The top law firms and accounting firms are based on:
http://en.wikipedia.org/wiki/List_of_100_largest_law_firms_by_revenue
http://www.accountingmajors.com/accountingmajors/articles/top100.html

Based on our snapshots, 1,511 funds or 9.69 percent of our fund sample experience fee changes between 1994 and 2010. This is comparable to Deuskar et al. (2013) who find that 596 funds out of the 7,613 funds in their sample (7.83 percent) change fees between 2001 and 2009. This is also consistent with Agarwal and Ray (2011) who report that 298 funds out of their sample of 3,814 funds (7.81 percent) change fees between 2008 and 2011. Next, we drop the 1,511 funds that changed fees from the sample and redo the Table 3 and 6 portfolio sorts as well as the Table 7 fee revenue analysis. We find that dropping hedge funds with fee changes from our analysis does not materially impact our findings.

5. Conclusion

Investors who place their capital at risk with hedge funds often rely on the reputation of the hedge fund manager and the belief that the conventional compensation contract guides the manager to act in their best interest. In this paper, we empirically characterize the behaviour of hedge fund firms. We find that the majority of hedge fund firms embarking on a growth strategy towards becoming a "mega" firm follow the route of launching multiple funds instead of growing the AUM of a single commingled fund. In particular, we find that over the 2005 to 2010 period, on average 88.54 percent of industry assets are managed by multiple product hedge fund firms and this figure has risen from 85.85 percent at the end of 2005 to 90.02 percent by the end of 2010. Moreover, multiple product firms control on average 94.45 percent of the capital managed by "mega" firms.

A majority of hedge fund firms grow their franchise by leveraging on the halo effect of a stellar first fund to launch follow-on funds that charge higher performance fees and set more onerous redemption terms. In general, funds that were conceived later by firms tend to underperform funds that were conceived earlier. Moreover, firms that launch many funds tend to underperform firms that do not and this declining performance extends to even first funds. There is, however, a brief period when a hedge fund manager first embarks on a capital raising campaign during which performance generally improves. Interestingly, in addition to the halo effect, we also find a significant blowback effect from the follow-on funds to the first fund. Lower follow-on fund returns are associated with lower flows into the first fund of the same hedge fund firm. Thus with multiple product firms, Berk and Green's (2004) flow performance

relationship seems to manifest itself as a halo effect in one direction and as a blowback effect in the reverse direction. This blowback effect constrains the multiple product asset gathering strategy and forces firms to address the quantity versus quality trade off while embarking on a growth path. Ironically, despite underperforming single product firms on average, multiple product firms are able to generate greater fee revenue. We also find that investors respond rationally to hedge fund firms' asset gathering strategy. Firms delivering alpha enjoy significantly positive capital inflows while the beta-only firms receive inflows that are indistinguishable from zero. This finding is consistent with Berk and Green's (2004) prediction that managers will continue to grow their AUM until investors perceive that their ability to generate alpha is exhausted.

Overall, the preponderance of evidence points to hedge fund managers being incentivized to launch multiple funds so as to maximize the total fee revenue to the management company. Historically, they have done so at the cost of performance. Nonetheless, asset-gathering behavior through multiple product offerings is a rational consequence of important agency and environmental forces at work. This asset-gathering behavior challenges the conventional argument that the existence of the incentive fee necessarily aligns managers' interests with those of their investors. However, until a more efficient compensation model emerges, hedge fund investors have limited tools to respond to such excessive asset-gathering behavior other than by voting with their feet.

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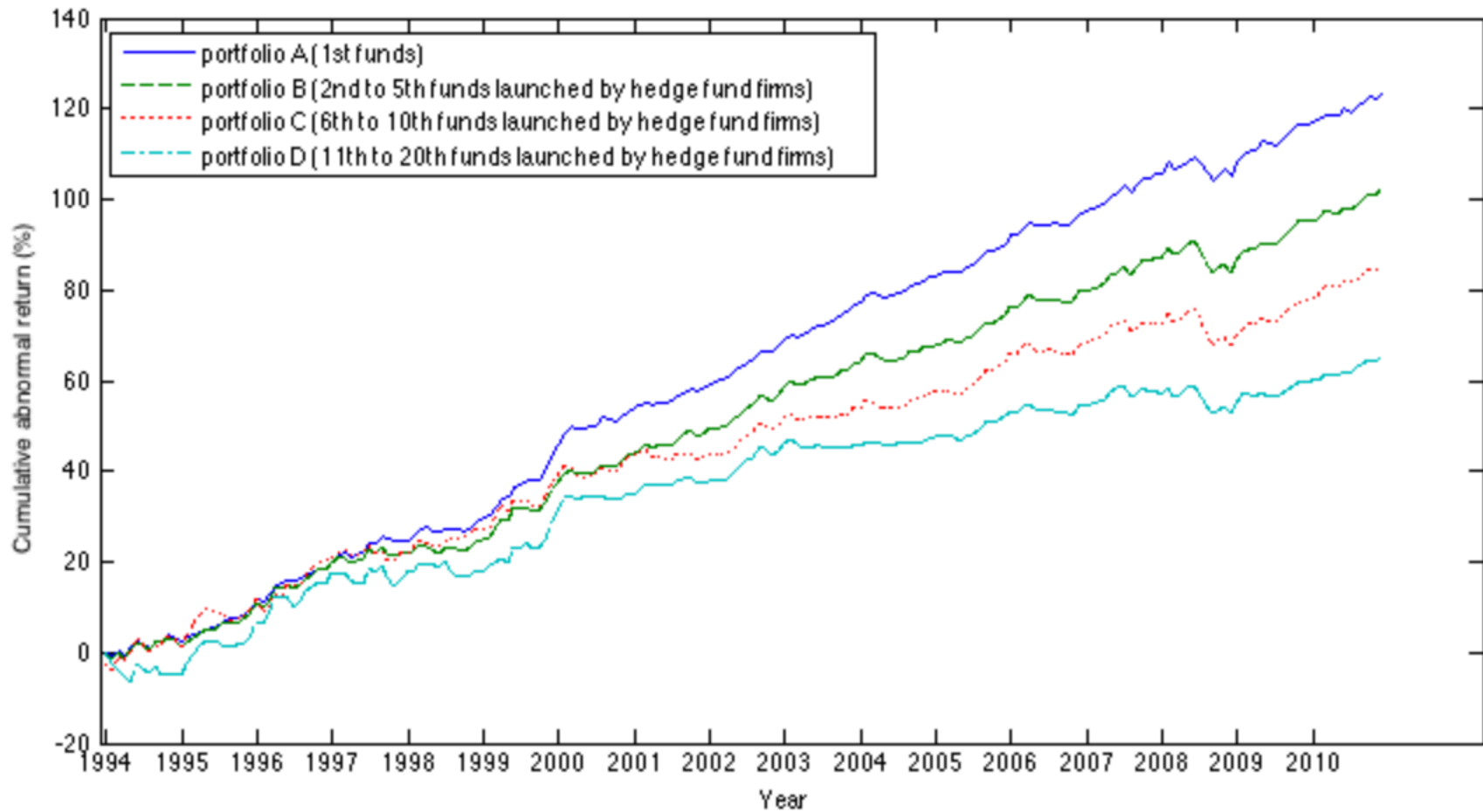
Fig 1: Cumulative abnormal return of funds sorted on fund inception date. Portfolios of hedge funds are constructed by sorting funds based on fund inception date. For each hedge fund firm, the first fund is the first fund launched by the firm. The first fund portfolio is the equal-weighted return of the first funds across firms. The other portfolios are defined analogously. Cumulative abnormal return is the difference between a portfolio's excess return and its factor loadings multiplied by risk factors from the Fung and Hsieh (2004) seven-factor model. Factor loadings are estimated over the entire evaluation period. The evaluation period is from January 1994 to December 2010.
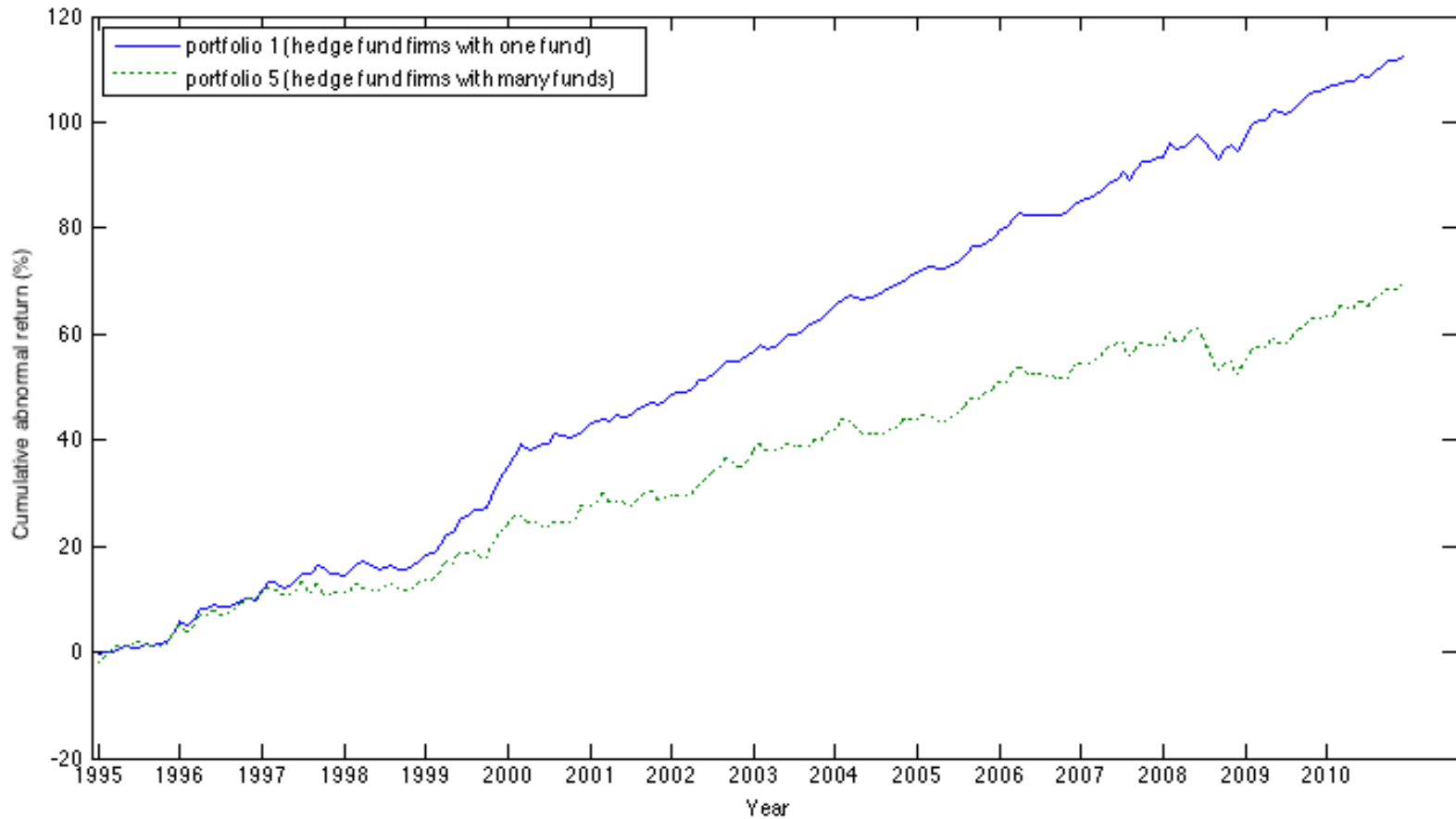
Fig 2: Cumulative abnormal return of hedge fund firms sorted by number of funds launched. Every January 1st, fund firms are sorted into five groups based on the number of funds previously launched by the firm. Portfolio 1 consists of firms that have only launched one fund. The rest of the firms are divided equally into the four remaining groups based on the number of funds launched. Portfolio 5 consists of the firms with the largest number of funds launched. Firm returns are constructed by value-weighting returns across all funds managed by the firm. Cumulative abnormal return is the difference between a portfolio's excess return and its factor loadings multiplied by risk factors from the Fung and Hsieh (2004) seven-factor model. Factor loadings are estimated over the entire evaluation period. The evaluation period is from January 1994 to December 2010.
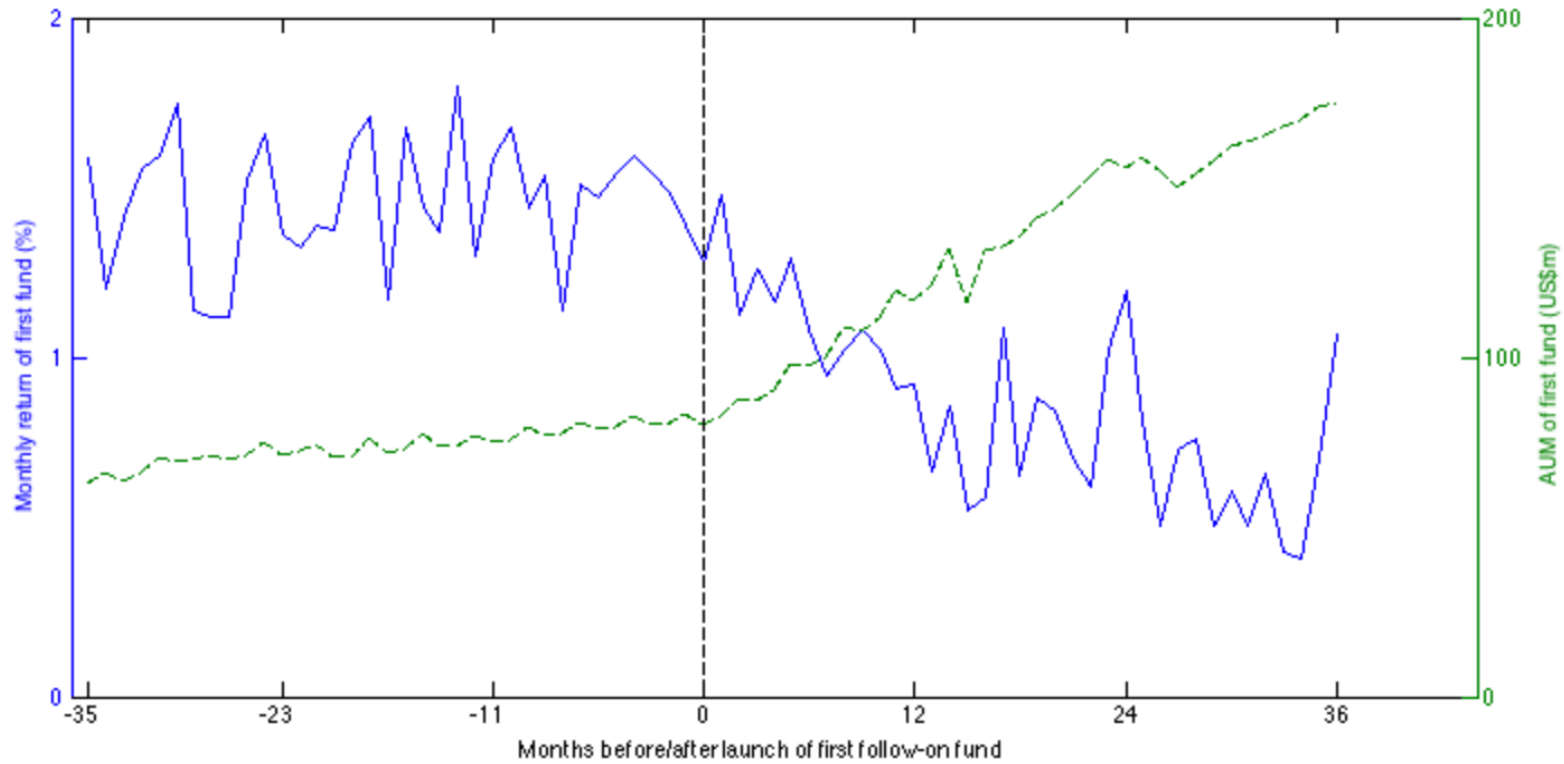
Fig 3: Average monthly return and assets under management of first funds before and after launch of the first follow-on fund by the same firm. For each hedge fund firm, the first fund is the first fund launched by the firm. First fund returns and assets under management (AUM) are averaged across firms. The sample includes firms that will launch or have launched at least one follow-on fund. Month 0 denotes the inception month for the first follow-on fund managed by the same firm. The return graph is represented by the solid line (y-axis on the left) while the AUM graph is represented by the dashed line (y-axis on the right). The sample period is from January 1994 to December 2010.
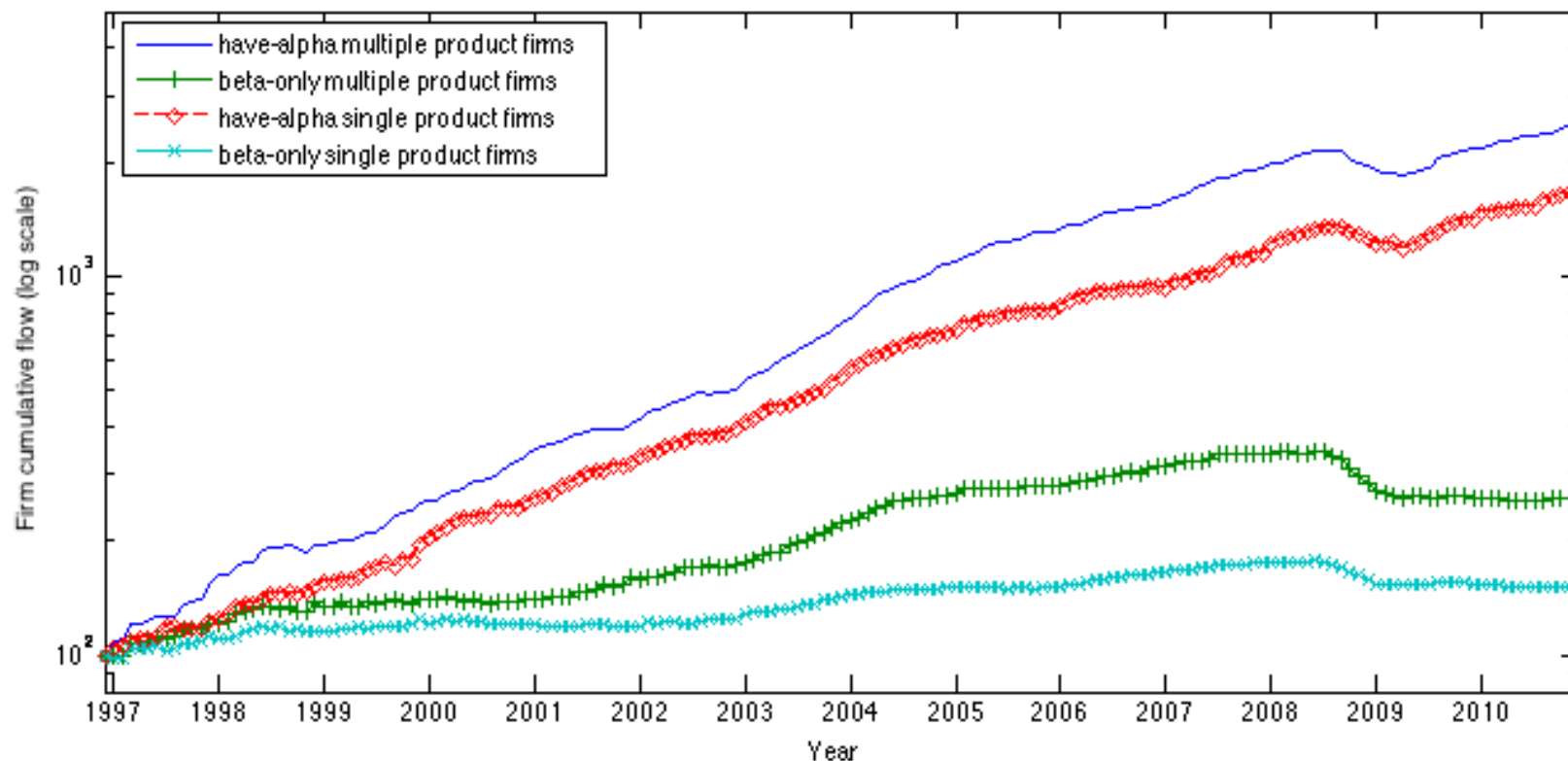
Fig 4: Cumulative firm flows for have-alpha and beta-only single and multiple product firms. The x-axis shows the month for which the flow index is plotted on a logarithmic scale on the y-axis. The index begins with a value of 100 in December 1996 and successive values are given by Index(g,q) = Index(g,q-1)*(1+F(g,q)) where F(g,q) is the flow percentage for group g for quarter q. Have-alpha firms are firms with statistically significant (at the 5% level) and positive alpha over the past 36-month period. All other firms are beta-only firms. Multiple product firms are firms that have launched more than one fund (determined on a rolling basis). Single product firms are firms that have launched only one fund. The sample period is from January 1994 to December 2010.

Table 1

Summary statistics

The sample period is from January 1994 to December 2010. Funds are grouped according to their primary investment strategy. Security Selection funds take long and short positions in undervalued and overvalued securities, respectively, and reduce systematic risks in the process. Usually, they take positions in equity markets. Multi-process funds employ multiple strategies that take advantage of opportunities created by significant transactional events, such as spin-offs, mergers and acquisitions, bankruptcy reorganizations, recapitalizations, and share buybacks. Directional Trader funds bet on the direction of market prices of currencies, commodities, equities, and bonds in the futures and cash market. Relative Value funds take positions in spread relations between prices of financial assets and aim to minimize market exposure.

Investment strategy	Total funds	Dead funds	First funds	Follow-on funds			Return months
				2nd-5th fund launched	6th-10th fund launched	11th-20th fund launched	
Panel A: Full sample							
Security Selection	7,466	4,825	3,056	2,589	749	561	424,030
Directional Trader	4,884	3,359	2,062	1,829	476	236	252,320
Relative Value	2,201	1,449	747	821	311	215	124,190
Multi-process	2,252	1,199	693	734	292	263	121,240
Others	1,545	1,258	786	526	107	101	61,433
Total	18,348	12,090	7,344	6,499	1,935	1,376	983,220
Panel B: Without duplicate share classes							
Security Selection	6,106	4,109	2,924	2,163	524	336	361,900
Directional Trader	4,344	3,087	2,009	1,711	352	150	230,870
Relative Value	1,804	1,232	707	696	224	109	103,480
Multi-process	1,943	1,022	651	635	242	193	107,050
Others	1,395	1,154	776	474	87	51	55,328
Total	15,592	10,604	7,067	5,679	1,429	839	858,630

Table 2

Regressions on follow-on fund fees, redemption terms, and flows

Regressions are estimated on the fees, redemption terms, and flows for follow-on funds managed by each hedge fund firm. For each firm, we distinguish between the first fund launched and other follow-on funds. In the fund attribute regressions, the independent variables include FIRSTRET and NFIRSTRET, where FIRSTRET is return of the first fund within the same firm averaged over the last x months prior to the launch of the follow-on fund and NFIRSTRET is the return of the other follow-on funds within the same firm averaged over the last x months prior to the launch of the follow-on fund. In the fund flow regressions, the independent variables include FIRSTRET, NFIRSTRET, and FUNDRET, where FUNDRET is own fund return averaged over the last x months, and FIRSTRET and NFIRSTRET are the returns of the first and other follow-on funds within the same firm averaged over the last x months. The regressions include controls for follow-on fund investment style fixed effects. The t-statistics, derived from White (1980) standard errors, are in parentheses. In Panels A, B, and C, the lookback period x equals 12, 24, and 36 months, respectively. The evaluation period is from January 1994 to December 2010. * Significant at the 5% level; ** Significant at the 1% level.

	Dependent variables				
Independent variables	Follow-on fund management fee	Follow-on fund performance fee	Follow-on fund redemption period	Follow-on fund notification period	Follow-on fund monthly flow
Panel A: Regressions with past one-year returns					
FIRSTRET	-0.010	0.235**	1.797*	0.595*	0.131**
	(-1.35)	(3.24)	(2.22)	(2.27)	(3.41)
NFIRSTRET	0.011	-0.139	0.082	-0.741*	-0.131**
	(0.85)	(-1.46)	(0.08)	(-2.14)	(-2.84)
FUNDRET					0.980**
					(25.43)
Adj R-squared	0.038	0.009	0.063	0.142	0.013
Panel B: Regressions with past two-year returns					
FIRSTRET	0.006	0.400**	3.850**	0.884*	0.165**
	(0.50)	(4.27)	(3.28)	(2.52)	(2.80)
NFIRSTRET	0.005	-0.406**	-1.12	-0.856	-0.095
	(0.25)	(-2.97)	(-0.80)	(-1.88)	(-1.42)
FUNDRET					1.013**
					(18.25)
Adj R-squared	0.039	0.017	0.064	0.135	0.009
Panel C: Regressions with past three-year returns					
FIRSTRET	0.009	0.417**	4.323**	0.873*	0.163*
	(0.53)	(3.21)	(3.18)	(2.14)	(1.96)
NFIRSTRET	-0.015	-0.539**	-3.114*	-1.07*	-0.083
	(-0.63)	(-3.16)	(-1.96)	(-2.10)	(-0.97)
FUNDRET					0.912**
					(12.06)
Adj R-squared	0.043	0.021	0.060	0.137	0.006

Table 3

Sorts on fund inception

Hedge funds are sorted based on their launch date within each hedge fund firm. Alpha is estimated relative to the Fung and Hsieh (2004) seven-factor model. The Fung and and Hsieh (2004) factors are S&P 500 return minus risk free rate (SNPMRF), Wilshire small cap minus large cap return (SCMLC), change in the constant maturity yield of the U.S. 10-year Treasury bond adjusted for the duration of the 10-year bond (BD10RET), change in the spread of Moody's BAA bond over 10-year Treasury bond appropriately adjusted for duration (BAAMTSY), bond PTFS (PTFSBD), currency PTFS (PTFSFX), and commodities PTFS (PTFSCOM), where PTFS is primitive trend following strategy. The *t*-statistics are derived from White (1980) standard errors. The sample period is from January 1994 to December 2010. Panel A reports results for the full sample of hedge funds while Panel B reports results for funds with AUM ≥ US\$20m. * Significant at the 5% level; ** Significant at the 1% level.

Fund portfolio	Excess Ret. (pct/ year)	*t*-stat of excess return	Alpha (pct/ year)	*t*-stat of alpha	SNPMRF	SCMLC	BD10RET	BAAMTSY	PTFSBD	PTFSFX	PTFSCOM	Adj. R²
Panel A: Full fund sample												
Portfolio A (1st funds)	8.24**	5.89	7.26**	9.40	0.25**	0.16**	0.02	0.16**	0.00	0.01*	0.01	0.72
Portfolio B (2nd to 5th fund launched)	7.03**	5.15	5.99**	6.54	0.22**	0.13**	0.06	0.18**	0.00	0.02**	0.01*	0.58
Portfolio C (6th to 10th fund launched)	6.03**	4.08	5.01**	4.38	0.20**	0.10**	0.08	0.23**	0.01	0.02*	0.02*	0.46
Portfolio D (11th to 20th fund launched)	4.91**	3.56	3.81**	3.39	0.18**	0.11**	0.07	0.16**	-0.01	0.02*	0.01	0.41
Spread (A - B)	1.21**	3.18	1.26**	3.99	0.04**	0.024**	-0.04**	-0.02	0.00	-0.01**	0.00	0.34
Spread (A - C)	2.21**	3.01	2.25**	3.28	0.05**	0.06**	-0.07*	-0.07**	-0.01	-0.01	-0.01*	0.24
Spread (A - D)	3.32**	4.19	3.45**	4.38	0.07**	0.05*	-0.06	0.00	0.01	-0.01	0.00	0.17
Panel B: Funds with AUM ≥ US\$20m												
Portfolio A (1st funds)	7.73**	5.20	6.59**	7.53	0.25**	0.17**	0.02	0.18**	0.00	0.01*	0.01*	0.68
Portfolio B (2nd to 5th fund launched)	6.53**	4.57	5.40**	5.61	0.22**	0.14**	0.04	0.21**	0.00	0.01*	0.01*	0.58
Portfolio C (6th to 10th fund launched)	5.41**	2.94	4.45**	2.83	0.20**	0.09*	0.05	0.28**	0.01	0.03*	0.02*	0.34
Portfolio D (11th to 20th fund launched)	2.22	1.26	0.98	0.65	0.20**	0.15**	0.12*	0.19**	0.00	0.01	0.02*	0.32
Spread (A - B)	1.20**	2.93	1.19**	3.13	0.03**	0.04**	-0.02	-0.02	0.00	-0.01*	0.00	0.22
Spread (A - C)	2.32	1.89	2.13	1.79	0.05*	0.09**	-0.03	-0.09*	-0.01	-0.02	-0.01	0.18
Spread (A - D)	5.51**	4.89	5.61**	4.92	0.05	0.03	-0.10*	-0.01	0.00	0.00	-0.01	0.07

Table 4

Sorts on fund inception, sensitivity analysis

Hedge funds are sorted based on their launch date within each hedge fund firm. Alpha is estimated relative to the Fung and Hsieh (2004) seven-factor model. The Fung and and Hsieh (2004) factors are S&P 500 return minus risk free rate (SNPMRF), Wilshire small cap minus large cap return (SCMLC), change in the constant maturity yield of the U.S. 10-year Treasury bond adjusted for the duration of the 10-year bond (BD10RET), change in the spread of Moody's BAA bond over 10-year Treasury bond appropriately adjusted for duration (BAAMTSY), bond PTFS (PTFSBD), currency PTFS (PTFSFX), and commodities PTFS (PTFSCOM), where PTFS is primitive trend following strategy. The t-statistics are derived from White (1980) standard errors. The sample period is from January 1994 to December 2010. Panel A reports results after removing the first 24 months of returns for each fund to adjust for backfill and incubation bias. Panel B reports results after unsmoothing returns using the Getmansky, Lo, and Makarov (2004) algorithm. Panel C reports results after adding back fees to form pre-fee returns. * Significant at the 5% level; ** Significant at the 1% level.

Fund portfolio	Excess Ret. (pct/ year)	t-stat of excess return	Alpha (pct/ year)	t-stat of alpha	SNPMRF	SCMLC	BD10RET	BAAMTSY	PTFSBD	PTFSFX	PTFSCOM	Adj. R^2
Panel A: Adjusted for backfill and incubation bias												
Portfolio A (1st funds)	6.84**	4.76	5.80**	7.30	0.26**	0.16**	0.02	0.18**	0.00	0.01*	0.01*	0.72
Portfolio B (2nd to 5th fund launched)	5.79**	4.06	4.66**	4.88	0.23**	0.13**	0.06	0.19**	0.00	0.02**	0.02*	0.58
Portfolio C (6th to 10th fund launched)	5.28**	3.23	4.17**	3.27	0.22**	0.09**	0.11	0.26**	0.01	0.02**	0.02*	0.44
Portfolio D (11th to 20th fund launched)	2.94*	2.16	1.86	1.77	0.19**	0.10**	0.08*	0.17**	0.00	0.01*	0.02*	0.44
Spread (A - D)	3.90**	4.81	3.94**	5.14	0.07**	0.06**	-0.07*	0.01	0.01	0.00	-0.01	0.19
Panel B: Adjusted for serial correlation												
Portfolio A (1st funds)	8.27**	5.50	7.24**	8.96	0.28**	0.17**	0.03	0.15**	0.00	0.01*	0.01	0.73
Portfolio B (2nd to 5th fund launched)	7.06**	4.83	5.97**	6.24	0.25**	0.15**	0.07	0.17**	0.00	0.01**	0.01*	0.60
Portfolio C (6th to 10th fund launched)	6.05**	3.89	4.98**	4.26	0.23**	0.11**	0.09	0.22**	0.01	0.02*	0.02*	0.49
Portfolio D (11th to 20th fund launched)	4.91**	3.32	3.74**	3.12	0.20**	0.12**	0.09	0.16**	0.00	0.01*	0.01	0.42
Spread (A - D)	3.36**	3.93	3.50**	4.12	0.08**	0.05*	-0.06	-0.01	0.01	-0.01	0.00	0.18
Panel C: Adjusted for fund fees												
Portfolio A (1st funds)	12.87**	9.04	11.88**	15.01	0.26**	0.15**	0.01	0.17**	0.00	0.01*	0.01*	0.71
Portfolio B (2nd to 5th fund launched)	11.26**	8.14	10.22**	11.03	0.22**	0.13**	0.06	0.18**	0.00	0.02**	0.01*	0.58
Portfolio C (6th to 10th fund launched)	9.95**	6.66	8.94**	7.74	0.21**	0.10**	0.08	0.23**	0.01	0.02*	0.02*	0.46
Portfolio D (11th to 20th fund launched)	8.23**	5.88	7.09**	6.21	0.18**	0.11**	0.08	0.16**	-0.01	0.02*	0.01	0.40
Spread (A - D)	4.64**	5.72	4.78**	5.99	0.07**	0.04*	-0.06*	0.01	0.01	-0.01	0.00	0.18

Table 5
Regressions on hedge fund performance

OLS and Fama-Macbeth (1973) regressions are estimated on the cross-section of hedge fund performance. The dependent variable is hedge fund monthly return or alpha. Alpha is estimated relative to the Fung and Hsieh (2004) seven-factor model. FIRST is an indicator variable that takes a value of one when a fund is the first fund launched by a firm and a value of zero otherwise. SIZE is last month fund assets under management in US$m. MGTFEE is fund management fee in percentage. PERFFEE is fund performance fee in percentage. NOTICE is fund redemption notice period in months. AGE is fund age in decades. The regressions include controls for fund investment style fixed effects. The *t*-statistics are in parentheses. For the OLS regressions, they are derived from White (1980) standard errors, while for the Fama-MacBeth regressions, they are derived from Newey and West (1987) standard errors. The sample period is from January 1994 to December 2010. * Significant at the 5% level; ** Significant at the 1% level.

| | Dependent variables | | | |
| | OLS | | Fama-MacBeth | |
Independent variables	Fund return	Fund alpha	Fund return	Fund alpha
FIRST	0.239**	0.209**	0.225**	0.210**
	(7.63)	(7.11)	(5.89)	(5.53)
Log(SIZE)	-0.081**	-0.055**	-0.044**	-0.045**
	(-15.38)	(-11.46)	(-3.69)	(-4.11)
Log(SIZE)*FIRST	-0.042**	-0.031**	-0.036**	-0.030**
	(-5.49)	(-4.40)	(-3.82)	(-3.33)
MGTFEE	0.058**	0.076**	0.065*	0.081**
	(4.50)	(6.22)	(2.31)	(3.11)
PERFFEE	0.011**	0.011**	0.009*	0.011**
	(8.71)	(10.33)	(2.48)	(4.39)
NOTICE	0.063**	0.038**	0.080**	0.051**
	(4.77)	(3.17)	(3.27)	(2.84)
AGE	-0.009**	-0.008**	-0.011**	-0.016**
	(-11.20)	(-11.10)	(-3.42)	(-5.14)
Adj R-squared	0.002	0.003	0.068	0.040

Table 6

Sorts on number of funds launched, performance analysis

Every January 1st, hedge fund firms are sorted into five groups based on the number of funds previously launched by the firm. Portfolio 1 consists of firms which have only launched one fund. The rest of the firms are divided equally into the four remaining groups based on the number of funds launched. Portfolio 5 consists of the group with the largest number of funds launched. Alpha is estimated relative to the Fung and Hsieh (2004) seven-factor model. The Fung and and Hsieh (2004) factors are S&P 500 return minus risk free rate (SNPMRF), Wilshire small cap minus large cap return (SCMLC), change in the constant maturity yield of the U.S. 10-year Treasury bond adjusted for the duration of the 10-year bond (BD10RET), change in the spread of Moody's BAA bond over 10-year Treasury bond appropriately adjusted for duration (BAAMTSY), bond PTFS (PTFSBD), currency PTFS (PTFSFX), and commodities PTFS (PTFSCOM), where PTFS is primitive trend following strategy. The *t*-statistics are derived from White (1980) standard errors. The evaluation period is from January 1994 to December 2010. In Panel A, firm returns are constructed by value-weighting returns across all funds within the firm. In Panel B, firm returns are constructed by equal-weighting returns across all funds within the firm. * Significant at the 5% level; ** Significant at the 1% level.

Hedge fund firm portfolio	Excess Ret. (pct/ year)	*t*-stat of excess return	Alpha (pct/ year)	*t*-stat of alpha	SNPMRF	SCMLC	BD10RET	BAAMTSY	PTFSBD	PTFSFX	PTFSCOM	Adj. R²
Panel A: Fund returns value-weighted within firm (full sample)												
Portfolio 1 (firms with one fund)	8.20**	5.45	7.04**	8.58	0.26**	0.17**	0.01	0.15**	0.00	0.01*	0.01	0.74
Portfolio 2	6.88**	4.00	5.32**	5.66	0.29**	0.19**	0.03	0.21**	0.00	0.01*	0.01	0.73
Portfolio 3	7.96**	5.70	6.66**	6.87	0.21**	0.11**	0.07	0.19**	0.00	0.02**	0.02*	0.57
Portfolio 4	5.95**	4.05	4.66**	4.85	0.22**	0.12**	0.05	0.19**	0.00	0.02**	0.02*	0.59
Portfolio 5 (firms with many funds)	5.76**	4.01	4.34**	4.15	0.19**	0.14**	0.10*	0.19**	0.00	0.02**	0.02*	0.51
Spread (1 - 5)	2.44**	3.55	2.70**	4.79	0.07**	0.03*	-0.09**	-0.03	0.00	-0.01*	-0.01*	0.35
Panel B: Fund returns equal-weighted within firm (full sample)												
Portfolio 1 (firms with one fund)	8.48**	5.68	7.33**	9.25	0.26**	0.17**	0.00	0.15**	0.00	0.01*	0.01	0.75
Portfolio 2	7.22**	4.16	5.63**	6.06	0.29**	0.20**	0.03	0.20**	0.00	0.01*	0.01	0.74
Portfolio 3	8.47**	6.38	7.28**	8.14	0.21**	0.11**	0.05	0.17**	0.00	0.01**	0.01	0.59
Portfolio 4	6.52**	4.43	5.22**	5.63	0.23**	0.12**	0.05	0.19**	0.00	0.02**	0.01	0.62
Portfolio 5 (firms with many funds)	5.72**	4.13	4.29**	4.35	0.19**	0.13**	0.09*	0.19**	0.00	0.02**	0.01*	0.53
Spread (1 - 5)	2.76**	4.10	3.04**	5.64	0.07**	0.04*	-0.09**	-0.03	0.00	-0.01*	-0.01*	0.38

Table 7

Sorts on number of funds launched, total fee revenue analysis

Every January 1st, hedge fund firms are sorted into five groups based on the number of funds previously launched by the firm. Portfolio 1 consists of firms which have only launched one fund. The rest of the firms are divided equally into the four remaining groups based on the number of funds launched. Portfolio 5 consists of the group with the largest number of funds launched. Annual firm total fee revenue in US$m are reported for each portfolio. Total fee revenue includes management fee and performance fee. Fund performance fee is calculated based on the assumptions outlined in Appendix A of Agarwal, Daniel, and Naik (2009) and after accounting for the high water mark feature in hedge fund incentive fee contracts. The sample period is from January 1994 to December 2010. The leftmost column reports results when the full sample of firms are sorted into five groups based on the number of funds launched. The other columns report results when firms are first sorted into quintiles based on firm AUM and then into five groups within each AUM quintile based on the number of funds launched. Panel A reports total fee revenue averaged by firm while Panel B reports the proportion of total fee revenue that is generated by the management fee averaged by firm. * Significant at the 5% level; ** Significant at the 1% level.

	Firm annual fee revenue					
	Sort on number of funds launched	*Double sort on firm AUM and number of funds launched*				
Hedge fund firm portfolio	Full sample	AUM quintile 1 (small firms)	AUM quintile 2	AUM quintile 3	AUM quintile 4	AUM quintile 5 (large firms)
Panel A: Total fee revenue						
Portfolio 1 (firms with one fund)	2.21	0.07	0.30	0.95	2.83	15.31
Portfolio 2	6.20	0.03	0.36	0.63	2.16	14.91
Portfolio 3	5.36	0.07	0.33	1.11	3.17	20.95
Portfolio 4	11.26	0.08	0.35	0.89	2.88	32.30
Portfolio 5 (firms with many funds)	22.26	0.20	0.38	1.03	3.17	44.74
Firm annual fee revenue spread (5 - 1)	20.04**	0.13	0.08*	0.09	0.34**	29.43**
Panel B: Proportion of fee revenue from management fee						
Portfolio 1 (firms with one fund)	0.45	0.47	0.44	0.42	0.42	0.46
Portfolio 2	0.45	0.60	0.53	0.48	0.47	0.44
Portfolio 3	0.48	0.50	0.55	0.48	0.47	0.47
Portfolio 4	0.48	0.62	0.50	0.49	0.50	0.46
Portfolio 5 (firms with many funds)	0.50	0.62	0.55	0.60	0.54	0.52
Difference in proportions (5 - 1)	0.05**	0.15*	0.10**	0.17**	0.11**	0.06*
Average AUM (US$m)	208.78	1.46	8.62	27.91	89.81	915.07

Table 8

Sorts on fund inception, conditional on the launch of follow-on funds

Hedge funds are sorted based on their launch date within each hedge fund firm. The first fund portfolio is the equal-weighted return of the first funds across firms. Alpha is estimated relative to the Fung and Hsieh (2004) seven-factor model. The Fung and and Hsieh (2004) factors are S&P 500 return minus risk free rate (SNPMRF), Wilshire small cap minus large cap return (SCMLC), change in the constant maturity yield of the U.S. 10-year Treasury bond adjusted for the duration of the 10-year bond (BD10RET), change in the spread of Moody's BAA bond over 10-year Treasury bond appropriately adjusted for duration (BAAMTSY), bond PTFS (PTFSBD), currency PTFS (PTFSFX), and commodities PTFS (PTFSCOM), where PTFS is primitive trend following strategy. The t-statistics are derived from White (1980) standard errors. The sample period is from January 1994 to December 2010. Panel A reports the performance of first and follow-on funds in multiple product firms. Panel B reports the performance of first funds in single product firms. * Significant at the 5% level; ** Significant at the 1% level.

Fund portfolio	Excess Ret. (pct/year)	t-stat of excess return	Alpha (pct/year)	t-stat of alpha	SNPMRF	SCMLC	BD10RET	BAAMTSY	PTFSBD	PTFSFX	PTFSCOM	Adj. R^2
Panel A: Multiple product firms												
Portfolio A (First funds before launch of first follow-on fund)	10.423**	7.86	9.77**	10.93	0.23**	0.14**	0.00	0.08	0.00	0.01*	0.02**	0.58
Portfolio B (First funds after launch of first follow-on fund)	6.46**	4.48	5.29**	6.00	0.24**	0.15**	0.05	0.21**	0.00	0.01**	0.01*	0.65
Portfolio C (First follow-on fund)	7.32**	5.40	6.23**	7.55	0.23**	0.13**	0.06	0.18**	0.00	0.01**	0.01*	0.65
Panel B: Single product firms												
Portfolio D (First funds of firms that will not launch follow-on funds)	7.91**	5.44	6.98**	9.12	0.27**	0.17**	0.00	0.14**	0.00	0.01*	0.01	0.74
Spread (A - B)	3.97**	8.53	4.48**	10.35	-0.01	-0.01	-0.05*	-0.13**	0.00	0.00	0.00	0.26
Spread (A - D)	2.52**	4.78	2.79**	6.14	-0.05**	-0.03**	0.00	-0.05*	0.00	0.00	0.01**	0.32
Spread (B - D)	-1.45**	-3.19	-1.70**	-3.87	-0.03**	-0.02	0.05**	0.08**	0.00	0.00	0.01*	0.17
Spread (B - C)	-0.86**	-4.33	-0.94**	-4.98	0.00	0.02**	-0.01	0.03**	0.00	0.00	0.00	0.21

Table 9

Regressions on follow-on fund inception returns

OLS regressions are estimated on the first follow-on fund inception performance. The dependent variables include follow-on fund returns and alpha averaged over the 6-month, 12-month, and 24-month post follow-on fund inception period. FIRSTRETURN is first fund return averaged over the 6-month, 12-month, and 24-month period just prior to first follow-on fund inception. FIRSTALPHA is first fund alpha averaged over the 6-month, 12-month, and 24-month period just prior to first follow-on fund inception. Fund alpha is fund abnormal returns measured relative to the Fung and Hsieh (2004) 7-factor model. NFIRSTSIZE is follow-on fund assets under management at inception in US$m. NFIRSTMGTFEE is follow-on fund management fee in percentage. NFIRSTPERFFEE is follow-on fund performance fee in percentage. NFIRSTNOTICE is follow-on fund redemption notification period in months. The multivariate regressions include controls for fund investment style fixed effects. The t-statistics, derived from White (1980) standard errors, are in parentheses. The sample period is from January 1994 to December 2010. * Significant at the 5% level; ** Significant at the 1% level.

	Dependent variables											
	Follow-on fund return						Follow-on fund alpha					
Independent variables	6-month horizon		12-month horizon		24-month horizon		6-month horizon		12-month horizon		24-month horizon	
FIRSTRETURN	0.052	0.102*	0.075*	0.074	0.068	0.029						
	(1.77)	(2.46)	(2.22)	(1.64)	(1.59)	(0.51)						
FIRSTALPHA							0.082*	0.137*	0.104*	0.108	0.102	0.043
							(2.05)	(2.24)	(2.30)	(1.75)	(1.71)	(0.52)
Log(NFIRSTSIZE)		-0.110		-0.079		-0.139*		-0.105		-0.113*		-0.119*
		(-1.83)		(-1.56)		(-2.58)		(-1.56)		(-2.44)		(-2.42)
NFIRSTMGTFEE		0.045		0.072		-0.045		0.366		0.060		0.048
		(0.26)		(0.63)		(-0.39)		(1.66)		(0.34)		(0.41)
NFIRSTPERFFEE		0.048		0.035*		0.013		0.033		0.024		-0.002
		(2.24)		(2.13)		(0.62)		(2.08)		(1.85)		(-0.11)
NFIRSTNOTICE		0.215		0.181		0.265*		0.099		0.220*		0.363**
		(1.82)		(1.84)		(2.46)		(0.75)		(2.13)		(3.75)
Adj R-squared	0.002	0.027	0.006	0.031	0.004	0.036	0.006	0.031	0.010	0.036	0.009	0.065

Table 10

Regressions on first fund returns in the post non-first fund inception period

OLS regressions are estimated on first fund performance post inception of first follow-on fund. The dependent variables include first fund returns and alpha averaged over the 6-month, 12-month, and 24-month period just after the inception of the first follow-on fund. FIRSTRETURN is first fund returns averaged over the 6-month, 12-month, and 24-month period just prior to first follow-on fund inception. FIRSTALPHA is first fund alpha averaged over the 6-month, 12-month, and 24-month period just prior to first follow-on fund inception. Fund alpha is fund abnormal returns measured relative to the Fung and Hsieh (2004) 7-factor model. FIRSTSIZE is first fund assets under management at follow-on inception in US$m. FIRSTMGTFEE is first fund management fee in percentage. FIRSTPERFFEE is first fund performance fee in percentage. FIRSTNOTICE is first fund redemption notification period in months. FIRSTAGE is first fund age in decades at follow-on fund inception. The multivariate regressions include controls for fund investment style fixed effects. The t-statistics, derived from White (1980) standard errors, are in parentheses. The sample period is from January 1994 to December 2010. * Significant at the 5% level; ** Significant at the 1% level.

| | Dependent variables | | | | | | | | | | | |
| | First fund return | | | | | | First fund alpha | | | | | |
Independent variable	6-month horizon		12-month horizon		24-month horizon		6-month horizon		12-month horizon		24-month horizon	
FIRSTRETURN	0.116*	0.069	0.118*	0.096	0.088	0.033						
	(2.34)	(1.08)	(2.41)	(1.52)	(1.80)	(0.63)						
FIRSTALPHA							0.154**	0.106	0.151**	0.164**	0.140*	0.138*
							(3.00)	(1.63)	(3.20)	(2.79)	(2.58)	(2.39)
Log(FIRSTSIZE)		-0.122*		-0.110*		-0.133**		-0.030		-0.038		-0.076*
		(-2.49)		(-2.53)		(-3.72)		(-0.66)		(-1.10)		(-2.57)
FIRSTMGTFEE		0.122		0.081		0.041		0.225		0.136		0.075
		(0.80)		(0.75)		(0.41)		(1.57)		(1.42)		(0.74)
FIRSTPERFFEE		0.056		0.020		0.014		0.044**		0.024*		0.013
		(3.47)		(1.95)		(1.44)		(3.30)		(2.59)		(1.38)
FIRSTNOTICE		0.061		0.110		0.007		0.029		0.074		-0.018
		(0.51)		(0.91)		(0.09)		(0.24)		(0.68)		(-0.31)
FIRSTAGE		0.106		0.337		0.309		-0.073		0.191		0.168
		(0.44)		(1.63)		(1.65)		(-0.34)		(1.12)		(1.03)
Adj R-squared	0.014	0.022	0.016	0.021	0.009	0.038	0.024	0.028	0.030	0.050	0.025	0.041

Table 11
Hedge fund firms sorted by AUM

Every year, hedge fund firms are sorted into deciles based on firm AUM at the end of the year. For each decile, panel A reports the number of firms, panel B reports the average firm AUM in US$m, panel C reports the proportion of multiple product firms (by number), and panel D reports the proportion of multiple product firms (by AUM). Panels E and F report the proportion of have-alpha, multiple product firms that operate or operated have-alpha flagships relative to the proportion of have-alpha, multiple product firms. Panels G and H report the proportion of beta-only, multiple product firms that operate or operated have-alpha flagships relative to the proportion of beta-only, multiple product firms. Multiple product firms are firms that have launched more than one fund (determined on a rolling basis). Single product firms are firms that have launched only one fund. Have-alpha firms are firms with Fung and Hsieh (2004) alphas, estimated over a 36-month rolling window, that are positive and statistically significant at the five percent level. All other firms are beta-only firms. The sample period is from January 1994 to December 2010. Since a 36-month rolling window is required to estimate alphas, the sorts only start in 1997. For brevity, we only report the results for 2005 and 2010, as well as the yearly average.

Year	Decile 1	Decile 2	Decile 3	Decile 4	Decile 5	Decile 6	Decile 7	Decile 8	Decile 9	Decile 10
Panel A: Number of firms										
2005	121	121	122	121	122	121	121	122	121	122
2010	140	141	141	140	141	141	140	141	141	141
Average (2005-2010)	137	137	138	137	138	137	137	138	137	138
Panel B: Firm AUM (US$m)										
2005	2	8	17	32	56	97	169	304	637	2,726
2010	2	8	18	33	51	82	132	234	537	3,386
Average (2005-2010)	2	8	18	33	55	95	163	299	630	3,212
Panel C: Proportion of multiple product firms (by number)										
2005	0.306	0.355	0.369	0.479	0.426	0.595	0.719	0.754	0.785	0.893
2010	0.336	0.411	0.454	0.421	0.496	0.596	0.686	0.652	0.816	0.908
Average (2005-2010)	0.326	0.352	0.403	0.473	0.487	0.624	0.711	0.743	0.806	0.903
Panel D: Proportion of multiple product firms (by AUM)										
2005	0.324	0.349	0.394	0.492	0.431	0.603	0.720	0.762	0.795	0.919
2010	0.356	0.437	0.473	0.421	0.509	0.591	0.682	0.672	0.806	0.961
Average (2005-2010)	0.340	0.348	0.417	0.474	0.490	0.628	0.711	0.752	0.804	0.944
Panel E: Proportion of have-alpha, multiple product firms (by number) with have-alpha first funds (current or in the past)										
2005	0.667	0.500	0.333	0.833	0.857	0.857	1.000	0.879	0.857	0.939
2010	0.000	0.750	0.900	0.667	0.714	0.824	0.824	0.833	0.815	1.000
Average (2005-2010)	0.708	0.581	0.544	0.859	0.840	0.849	0.882	0.882	0.872	0.943
Panel F: Proportion of have-alpha, multiple product firms (by AUM) with have-alpha first funds (current or in the past)										
2005	0.684	0.546	0.346	0.824	0.839	0.873	1.000	0.878	0.862	0.946
2010	0.000	0.677	0.907	0.678	0.709	0.828	0.830	0.847	0.832	1.000
Average (2005-2010)	0.727	0.588	0.546	0.852	0.838	0.858	0.890	0.884	0.878	0.946
Panel G: Proportion of beta-only, multiple product firms (by number) with have-alpha first funds (current or in the past)										
2005	0.382	0.243	0.641	0.630	0.578	0.638	0.594	0.695	0.617	0.667
2010	0.467	0.478	0.574	0.660	0.667	0.642	0.684	0.649	0.727	0.809
Average (2005-2010)	0.418	0.427	0.566	0.613	0.631	0.653	0.667	0.671	0.720	0.760
Panel H: Proportion of beta-only, multiple product firms (by AUM) with have-alpha first funds (current or in the past)										
2005	0.467	0.225	0.643	0.654	0.576	0.637	0.611	0.706	0.618	0.598
2010	0.498	0.477	0.573	0.656	0.664	0.632	0.700	0.646	0.730	0.778
Average (2005-2010)	0.417	0.431	0.570	0.617	0.633	0.653	0.667	0.669	0.722	0.738

Table 12

Regressions on first fund flows

Regressions are estimated on the flows of the first funds managed by each hedge fund firm. For each firm, we distinguish between the first fund launched and other follow-on funds. The independent variables include FUNDRET, and NFIRSTRET, where FUNDRET is own fund return averaged over the last x months, and NFIRSTRET is the average return of the follow-on funds within the same firm averaged over the last x months. The regressions include controls for fund investment style fixed effects. The t-statistics, derived from White (1980) standard errors, are in parentheses. In panels A, B, and C, the lookback period x equals 12, 24, and 36 months, respectively. The sample period is from January 1994 to December 2010. * Significant at the 5% level; ** Significant at the 1% level.

Independent variables	Dependent variable First fund monthly flow
Panel A: Regressions with past one-year returns	
FUNDRET	0.602**
	(11.75)
NFIRSTRET	0.307**
	(5.60)
Adj R-squared	0.013
Panel B: Regressions with past two-year returns	
FUNDRET	0.773**
	(9.73)
NFIRSTRET	0.372**
	(4.41)
Adj R-squared	0.011
Panel C: Regressions with past three-year returns	
FUNDRET	0.844**
	(8.98)
NFIRSTRET	0.215*
	(2.08)
Adj R-squared	0.007

Table 13
Robustness tests

The leftmost columns report results when hedge funds are sorted based on their launch date within each hedge fund firm. The rightmost columns report results when hedge fund firms are sorted every January 1st into five groups based on the number of funds previously launched by the fund family. In the hedge fund firm sort, fund returns are value-weighted within each firm. Alpha is estimated relative to the Fung and Hsieh (2004) seven-factor model. The Fung and and Hsieh (2004) factors are S&P 500 return minus risk free rate (SNPMRF), Wilshire small cap minus large cap return (SCMLC), change in the constant maturity yield of the U.S. 10-year Treasury bond adjusted for the duration of the 10-year bond (BD10RET), change in the spread of Moody's BAA bond over 10-year Treasury bond appropriately adjusted for duration (BAAMTSY), bond PTFS (PTFSBD), currency PTFS (PTFSFX), and commodities PTFS (PTFSCOM), where PTFS is primitive trend following strategy. The *t*-statistics are derived from White (1980) standard errors. The sample period is from January 1994 to December 2010.

Sorts on fund inception			Sorts on number of funds launched		
Fund portfolio	Alpha	*t*-stat of alpha	Firm portfolio	Alpha	*t*-stat of alpha
Panel A: Adjusted for structural breaks					
Portfolio A (1st funds)	7.22	9.72	Portfolio 1 (firms with one fund)	6.90	8.93
Portfolio D (11th to 20th fund)	3.82	3.67	Portfolio 5 (firms with many funds)	3.81	3.73
Spread (A - D)	3.40	5.10	Spread (1-5)	3.10	5.82
Panel B: Adjusted for dynamic risk exposures using 36-month rolling betas					
Portfolio A (1st funds)	7.27	7.34	Portfolio 1 (firms with one fund)	7.01	6.87
Portfolio D (11th to 20th fund)	3.57	2.68	Portfolio 5 (firms with many funds)	3.26	2.57
Spread (A - D)	3.70	4.30	Spread (1-5)	3.74	5.38
Panel C: Fung and Hsieh (2004) model augmented with an emerging markets equity factor					
Portfolio A (1st funds)	7.19	10.93	Portfolio 1 (firms with one fund)	6.88	10.14
Portfolio D (11th to 20th fund)	3.75	3.60	Portfolio 5 (firms with many funds)	4.17	4.53
Spread (A - D)	3.44	4.36	Spread (1-5)	2.71	4.77
Panel D: Fung and Hsieh (2004) model augmented with out-of-the money call and put option factors					
Portfolio A (1st funds)	6.89	7.98	Portfolio 1 (firms with one fund)	6.44	7.04
Portfolio D (11th to 20th fund)	2.92	2.06	Portfolio 5 (firms with many funds)	3.62	3.06
Spread (A - D)	3.97	3.98	Spread (1-5)	2.82	4.22
Panel E: Fung and Hsieh (2004) model augmented with Pastor and Stambaugh (2003) liquidity factor					
Portfolio A (1st funds)	7.05	8.80	Portfolio 1 (firms with one fund)	6.81	8.16
Portfolio D (11th to 20th fund)	3.62	3.12	Portfolio 5 (firms with many funds)	4.02	3.68
Spread (A - D)	3.43	4.29	Spread (1-5)	2.79	4.75
Panel F: Adjusted for fund termination					
Portfolio A (1st funds)	5.99	7.81	Portfolio 1 (firms with one fund)	5.55	6.83
Portfolio D (11th to 20th fund)	2.89	2.57	Portfolio 5 (firms with many funds)	3.13	3.01
Spread (A - D)	3.10	3.97	Spread (1-5)	2.42	4.26
Panel G: Style-adjusted returns					
Portfolio A (1st funds)	1.10	8.87	Portfolio 1 (firms with one fund)	0.38	1.66
Portfolio D (11th to 20th fund)	-2.67	-3.74	Portfolio 5 (firms with many funds)	-1.96	-6.95
Spread (A - D)	3.76	5.02	Spread (1-5)	2.34	5.33
Panel H: Out-of-sample tests					
Portfolio A (1st funds)	9.55	10.59	Portfolio 1 (firms with one fund)	9.39	8.50
Portfolio B (2nd to 5th fund)	7.99	7.18	Portfolio 5 (firms with many funds)	6.38	4.84
Spread (A - B)	1.56	2.64	Spread (1-5)	3.02	3.52