

# Mutual Fund Incubation\*

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## **Abstract**

Incubation is a strategy for initiating new funds where multiple funds are started privately and at the end of an evaluation period, some of them are opened to the public. Consistent with incubation being used by fund families to increase performance and attract flows, funds in incubation outperform non-incubated funds by 3.5% risk-adjusted and when they are opened to the public, they attract higher net dollar flows. Post-incubation, however, this outperformance disappears. This performance reversal imparts an upwards bias to returns that is shown to affect inferences regarding fund performance, size and inflows. A correction for this bias is proposed.

The prevalence of the fund family structure in the asset management industry suggests that families play an important role in economics of mutual fund investments. A number of papers have examined the strategic decisions of families. An important message of this research is that the fund family's strategy for maximizing firm value by maximizing assets under management has at least four dimensions: fee schedules, distribution channel, the breadth of fund offerings and performance. Through setting fee schedules for a fund (i.e. management fee, 12b-1 fee, etc.)<sup>1</sup>, choosing a particular distribution channel (brokered or direct)<sup>2</sup> and deciding on the overall breadth of their fund offerings (i.e. starting a fund in a new investment objective category)<sup>3</sup> families can influence investment flows and consequently their total net assets under management. How a family competes on the dimension of performance, however, is less obvious. With the well-documented relationship between fund flows and performance<sup>4</sup> it is clear that families want to increase fund performance in order to increase fund inflows. Given the equally well-documented underperformance of actively managed mutual funds<sup>5</sup>, however, how can a fund family increase the probability that their fund offerings have superior performance?<sup>6</sup> This paper focuses on a previously unexplored performance-enhancing strategy for fund families, incubation.

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<sup>1</sup> Massa (2003) shows that fund families compete on the basis of both fees and breadth of offerings in addition to performance and Christoffersen (2001) shows that fund families strategically waive fees on their money market funds to attract additional inflows.

<sup>2</sup> Bergstresser, Chalmers, Tufano (2009) and Christoffersen, Evans and Musto (2009) both examine the impact of different distribution channels on fund and family flows.

<sup>3</sup> Khorana and Servaes (1999) examine the family-level decision to open a new fund and show that it is related to fee and flow maximization considerations.

<sup>4</sup> For example, Ippolito (1992), Chevalier and Ellison (1997) and Sirri and Tufano (1998) all document that higher performance is positively related with higher net flows. Nanda, Wang and Zheng (2004) also document that having a high performing or 'star' fund attracts flows to other funds in the family as well.

<sup>5</sup> For example, Jensen (1968), Carhart (1997) and French (2008) all document this underperformance.

<sup>6</sup> Gaspar, Massa, Matos (2006) and Guedj and Papastaikoudi (2005) both examine family-level cross-subsidization and find that it positively affects performance for select funds.

Mutual fund incubation is a strategy that some fund families use to develop new fund offerings. In incubation, families open multiple new funds, often with a limited amount of capital. At the end of an evaluation period, some funds are opened to the public, while the others are shut down before investors ever become aware of them. The existence of this practice of incubation raises four questions. First, why do fund families incubate? Second, does fund incubation attract additional investment flows? Third, which families incubate? Fourth, does the inclusion of surviving incubated fund returns in mutual fund databases lead to a bias in returns and if so, can this bias be mitigated?

With respect to the first question, I show that incubation plays an important role in the development of new mutual funds and that it enhances the performance of those funds. For a sample of newly created US domestic equity funds between 1996 and 2005, approximately 23% of new funds were incubated and they outperformed the non-incubated funds annually by 3.5% on a risk-adjusted basis. This outperformance could be due to the identification of superior managers or investment strategies. Gervais, Lynch and Musto (2005) suggest that the fund family structure exists to certify manager ability to investors. While their model focuses on the role of firing poorly performing managers, incubation could serve as a means for the family to identify and certify superior managers. An alternative explanation is that the superior incubated fund performance is due to the contrived ex post selection of the best performing funds. To test between these two hypotheses, I examine the difference in returns between incubated and non-incubated funds after removing the incubation period performance. If incubated funds continue to outperform their non-incubated counterparts, this would be evidence that the family had identified a superior manager or investment strategy. The difference, however, is not statistically significant. I also find that manager tenure is shorter at fund families that incubate. If incubation

identified superior managers, I would expect their tenure to be longer. The reversal of this outperformance post-incubation and the shorter manager tenure for families that incubate suggests that either incubation is not used to select superior managers/investment strategies or that it is an ineffective mechanism for this task.

To address the second question, does fund incubation attract additional flows, I regress net dollar flows on fund characteristics including an indicator variable for whether or not the fund was incubated. The SEC allows fund families to advertise the incubation period performance of these funds. In order for incubation to be an effective performance-enhancement strategy, investment flows must respond positively to incubation-period returns. The dramatic outperformance during incubation and the comparable performance post-incubation suggests that incubation period performance is specious. As a result, we might expect investors to disregard this performance. However, I find that before controlling for fund performance and other characteristics, incubated funds have higher net dollar flows than non-incubated funds. After controlling for performance and other fund characteristics, there is no statistically or economically significant difference in flows to the two types of funds. This is consistent with investors preferring incubated funds on the basis of their outperformance.

I answer the third question, through an analysis of the family-level determinants of the fund incubation decision. Using a multinomial logit framework, I examine the decisions to open an incubated and a non-incubated fund both relative to not opening a new fund. While the determinants of opening an incubated and a non-incubated fund are very similar on many dimensions, I find that families are more likely to incubate a fund in an investment objective where the family's current offerings are attracting lower net dollar flows, consistent with a desire to increase performance and consequently flows to these investment objectives. I also find that

the probability of incubation is higher for families that are sold primarily through brokers. This result is significant because we expect broker-distributed fund families to compete on the basis of performance and not fees and previous research, including Bergstresser, Chalmers and Tufano (2009), has established that flows through brokered channels are more sensitive to performance. Overall the evidence suggests that incubation is used by families to speciously enhance performance and thereby increase flows and that it is an effective tool in this regard.

To answer the fourth and final question, does incubation impart a bias in returns, I revisit the results from the incubated vs. non-incubated performance difference test. Under the null hypothesis that there is no difference in performance between incubated and non-incubated funds, the return difference of 3.5% suggests that including incubation period returns upwardly biases returns. I also examine the impact of incubation on the full sample of domestic equity returns. I find that including incubation period returns upwardly biases performance. The bias in 4-factor alphas and equal-weighted returns are 0.43% and 0.84% annually. Looking at value-weighted returns, however, there is no bias.

To assess the potential impact of this bias on mutual fund research, I reexamine two key results in the literature: the positive relationship between fund flow and performance (Sirri and Tufano, 1998) and the negative relationship between fund size and performance (Chen, Hong, Huang, Kubik, 2004). I find that including incubated fund data in an analysis of fund flows and performance overstates the relationship between flow and high performance. Because surviving incubated funds typically have smaller total net assets (TNA), the flows to incubated funds may be small in dollar terms, but they are large in percentage terms (owing to the small denominator). These high-percentage flows, when combined with the artificially high performance of incubated funds, result in an overstated relationship between flows and performance. With respect to fund

size and performance, I find that including incubated funds in the regression overstates the size-performance relationship. Because incubated funds have artificially high performance and tend to be small during incubation but are larger and have average performance post-incubation, including incubation period performance increases the relationship between fund size and performance.

To address this incubation bias, I propose a filter for incubation period performance. When a new fund is first sold to the public, the fund sponsor or family applies for a ticker. The NASD keeps a record of the date that each fund's ticker was created. Using the ticker creation date as a proxy for the end of incubation, I remove all fund performance data before that date. When this filter is applied, the bias is removed.

While the ticker creation date data is only available for funds that were in existence as of 1999 or later, I also examine a more general age filter that can be applied to earlier sample periods. Removing the first three years of return data for all funds eliminates the bias. This is not surprising given the small fraction of the sample (less than 5%) that are in incubation for longer than 36 months. Using an age filter, however, does remove valid early return data for the non-incubated sample.

One common approach to addressing the incubation bias is to apply a total net assets (TNA) filter and remove funds below a certain size (typically \$25 million). I show that this approach to filtering out incubated funds has two problems. First, a TNA filter of \$25 million only removes 47% of incubated funds. Second, the TNA filter also excludes non-incubated funds from the sample. I show that 24% of the non-incubated funds in the sample are excluded by the TNA filter and that these funds have systematically worse performance than the non-incubated funds remaining in the sample.

The paper proceeds as follows: Section I discusses the details of incubation and provides an example, Section II discusses the previous literature, Section III describes the database, Section IV examines the results, and Section V concludes.

## **I. Incubation**

### *A. Public and Private Incubation*

There are two different types of incubation in the data: public and private. Although I cannot distinguish between these types in my data<sup>7</sup>, it is useful for the reader to understand the differences between them. Both of these strategies operate on the same basic principle of selecting a fund with superior performance from a group of funds. In public incubation, the fund family uses a small amount of seed money raised internally (either from the management company or from employees of the management company) to start an initial group of funds. After the funds are run for a long enough period to generate a track record, a decision is made as to which funds will be opened to the public (incubation survivors) and which funds will be terminated (incubation non-survivors). I refer to this process as public incubation because the fund family registers the funds with the SEC and submits the appropriate filings for each fund. They are effectively private, however, because the funds don't have tickers and are often not reported to Morningstar, CRSP, Lipper, or other mutual fund data providers until the fund sponsor is ready to open them to the public.

Private incubation is the conversion of the best-performing private accounts managed by an advisor into public mutual fund offerings. Many investment advisors manage assets through both public (e.g., mutual funds) and private (e.g., separate accounts) vehicles. Investors in the

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<sup>7</sup> To identify incubated funds, I use a lag between the start date of the fund and the date that the fund applies for a ticker. Because both publicly and privately incubated funds will exhibit delays in this variable, I cannot distinguish between them in my sample.

privately managed assets can include endowments, trusts, high-net-worth individuals, and others. These privately managed assets are typically not governed by the Investment Company Act of 1940, and as a result, the advisor does not file registration statements, prospectuses, etc. with the SEC. The advisor can, however, include the performance of the unregistered private account in the prospectus advertising the mutual fund under certain conditions (for additional details see section I.C). By choosing the best-performing private accounts to convert to publicly available mutual funds and backfilling the performance of those funds, private incubation can give rise to a bias in returns.

### *B. Public Incubation: An Example*

To better understand the incubation bias, I examine a survivor and a non-survivor of public incubation. The Putnam Research Fund is an example of a surviving incubated fund. Figure 1 shows the size and performance of Putnam Research. The fund began operation in October 1995, with approximately \$3 million under management. All of the seed capital was provided by Putnam,<sup>8</sup> and there were few inflows from outside investors until the middle of 1998, most likely because the fund was not advertised until July of 1998. As the figure shows, during incubation, the Putnam Research fund outperformed other funds with the same investment objective by 5.3% per year and the fund's average return was 28% per year. In the middle of 1998, Putnam applied for and was issued a ticker<sup>9</sup> for the fund and first advertised the fund in its marketing materials.<sup>10</sup> Shortly thereafter, the fund began appearing in the CRSP and

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<sup>8</sup> The October 2, 1995, Statement of Additional Information (SAI) of the Putnam Research Fund lists the following principal shareholder information under the heading of Share Ownership: "On August 31, 1995 to the knowledge of the Trust no person owned of record or beneficially 5% or more of the shares of any fund of the Trust, except that Putnam Investments, Inc. owned of record and beneficially 100% of Putnam Research Fund." Subsequent SAIs showed that until the end of incubation, Putnam continued to be a principal shareholder of the fund.

<sup>9</sup> The Putnam Research Fund ticker, PNRAX, was created by NASDAQ on July 13, 1998.

<sup>10</sup> Lexis-Nexis shows the first full prospectus for the Putnam Research fund appeared in October 1995. The first advertisement of the Putnam Research fund in the prospectus of another Putnam fund, however, appeared in July 1998. In that prospectus, Putnam Research is included in a list of all the Putnam funds available for purchase.

Morningstar databases. It is interesting to note that the relative outperformance of the fund begins to decline around this date.

The Putnam Latin America Fund, a non-surviving incubated fund, serves as an interesting contrast to the previous example of a surviving incubated fund. The fund began operations in 1998, with approximately \$2 million in assets. The average annual return of the fund over its life was -0.62% annualized,<sup>11</sup> and in 2001, the fund was shut down.

When the Putnam Research fund was opened to the public, the fund's successful track record was added to CRSP and other fund databases. The Putnam Latin America fund, however, was never opened to the public and, as a result, its track record was not added to CRSP. If performance plays a role in the decision of whether or not to open a fund to the public, this selective inclusion of fund returns may give rise to a bias.

### *C. The Regulation Regarding Incubation*

The legal issues associated with incubation have been established through a series of no-action letters from the Securities and Exchange Commission (SEC). In February 1997, the SEC responded to a query about incubation from a private citizen.<sup>12</sup> The response, which became part of the public record, outlines the SEC's position on public incubation:

You ask whether a mutual fund sponsor can establish a number of lightly capitalized private pools for the purpose of generating performance track records. In the situation you describe, the sponsor...would select the pools with the best returns and take them public, touting their excellent past performance.... The hypothetical you raise is one that the Division terms the "incubator fund" problem. The Division has consistently, for close to thirty years, expressed severe reservations about these funds. In particular, the Division has been concerned that a mutual fund is likely to be managed differently than it was during its "incubation period" and that it is potentially misleading for a fund sponsor of a number of incubator funds organized at the same time to select and cite the performance of a single incubator fund without disclosing the performance of other similar but less successful incubator funds. These concerns underlie the

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<sup>11</sup> This is the return of the fund from 3/23/98 to 12/31/99, as reported in the last prospectus filed for the fund.

<sup>12</sup> The inquiry was made by Dr. William Greene, then a department chair at the Stern School of Business.

Division's longstanding position that ... incubator fund performance should not be included in a mutual fund's prospectus in the absence of extremely clear disclosure explaining the sponsor's purpose in establishing the incubator fund.

In outlining its position, the SEC also provides its definition of an incubated fund. There are two principal components of this definition. First, the SEC restricts the classification to private funds or those funds that are not registered with the SEC. Second, the SEC only classifies funds as incubated that are started "for the purpose of generating performance track records." This terminology refers to a situation in which multiple funds of the same or similar investment objective are incubated. If a fund meets these criteria, the SEC considers it an incubated mutual fund. In practice, fund families that incubate are not subject to the SEC's definition in two respects. First, while the SEC definition would only classify private funds as incubated, a fund is technically public if the family files the registration and prospectus with the SEC. By not reporting the fund to Morningstar or other mutual fund data sources, however, the family can ensure that its "public" fund is effectively private. Second, by incubating funds with different investment objectives, the family can avoid the second aspect of the SEC's definition described above. Diversification across investment objectives is economically sensible, as it increases the probability of obtaining at least one fund with a superior track record.

In addition to the restrictions placed on incubation described in the NYU no-action letter, the conversion of a private account to a public one (incubated or otherwise) is subject to a number of other restrictions. These additional restrictions are described in a previous no-action letter to Mass Mutual Institutional Funds (publicly available Sept. 28, 1995). In the letter, the SEC outlines its criteria for allowing a mutual fund sponsor to adopt the performance record of an unregistered predecessor account. The requirements are fourfold: the investment adviser remains the same; the predecessor account is not created for the purpose of incubation; the

investment strategy remains the same; and the management practices remain the same. Additionally, the SEC requires the fund company to provide the following disclosures when using the past performance: that the performance data includes unregistered account data, that the fund was not subject to the pertinent SEC restrictions, and that the fund's performance might have suffered if it had been subject to those restrictions (Pierce, 1998).

## **II. Previous Literature**

This paper contributes to two different areas of the literature: the economics of mutual fund families and the survivorship bias literature. With respect to the economics of fund families, Chevalier and Ellison (1997) suggest that the principal objective of fund companies is to maximize their value by maximizing the total net assets they manage. Given the strong positive relationship found between net investment flows to mutual funds and past performance (e.g. Ippolito, 1992, Chevalier and Ellison, 1997, Sirri and Tufano, 1998), maximizing fund performance is one approach to maximizing total net assets. In addition to the direct effect of performance on flows, Nanda, Wang and Zheng (2004) find that there are spillover flow effects for families with a high-performing fund.

Given the average underperformance of actively managed mutual funds documented by Jensen (1968), Carhart (1997), French (2008) and others, maximizing fund performance may seem to be a daunting challenge. The literature suggests a few strategies employed by fund families to enhance performance. Christoffersen (2001) shows that money market funds strategically waive their fees in order to boost performance and attract additional inflows. Gaspar, Massa and Matos (2006) and Guedj and Papastaikoudi (2005) both suggest another family strategy for enhancing fund performance: cross-fund subsidization. Both papers suggest

that families have an incentive to subsidize certain funds at the expense of others. Gaspar, Massa and Matos (2006) characterize “high-value” funds as those with high fees or good past performance that can generate more revenue for the family and “low-value” funds as those with low fees, poor performance and little revenue-generation potential. In both papers, the authors find evidence that high-value funds outperform at the expense of low-value funds, consistent with cross-fund subsidization.

This paper contributes to the literature by documenting a new strategy for enhancing fund performance: incubation. Consistent with a performance-maximization motive, incubated funds outperform non-incubated funds during incubation but there is no performance difference post-incubation. Investors respond to this outperformance and incubated funds receive greater net dollar flows. A family-level analysis of the determinants of fund incubation also suggests that incubation is used strategically to increase performance and flows. Fund families are more likely to incubate a fund in investment objectives where their current fund offerings have lower flows and families that are primarily broker-sold and consequently more likely to compete on the basis of fund performance are more likely to incubate.

The existence of a survivorship bias in mutual fund data is well established in the literature. Brown, Goetzmann, Ibbotson and Ross (1992) argue that survival biases in mutual fund data may give rise to spurious indications of performance persistence. Brown and Goetzmann (1995) use a sample of both surviving and defunct mutual funds to calculate the survivorship bias and show that poorly performing mutual funds are more likely to be terminated. To address the issue of survivorship bias, Carhart (1997) collected a mutual fund database free of survivorship bias that was the precursor of the commonly used CRSP Survivorship Bias Free Mutual Fund Database. By including data from both active and inactive mutual funds

(those that have been terminated through merger or liquidation), the database eliminates traditional survivorship-bias concerns. The database, however, is subject to a different type of survivorship bias, incubation. The CRSP manual states: “There is a selection bias favoring the historical data files of the best past-performing private funds which became public. The SEC has recently begun permitting some funds (and eventually probably all funds) with prior return histories as private funds to splice these returns onto the beginning of their public histories. The effect of this is that only the successful private fund histories are included in the database.” In addition to the private incubation bias described by CRSP, I find that the database is also subject to a public incubation bias.

The existence of an incubation bias has also been recognized by the academic literature. Both Malkiel (1995) and Elton, Gruber, and Blake (2001) suggest that successful funds may have track records that are backfilled. This “instant history” or backfill bias in hedge fund databases is similarly recognized by Park (1995) and Fung and Hsieh (2002).

In examining the bias, the closest-related research is Arteaga, Ciccotello, and Grant (1998) and Wisen (2002). Both papers examine the bias in returns for new funds and, in that context, discuss the issue of incubation. Arteaga, Ciccotello, and Grant (1998) include an analysis of five surviving incubated funds as an indication of the type of bias that may be induced by failure to include return data for the incubation non-survivors in fund databases. In the hedge fund literature, the impact of a backfilling bias on performance has been examined by Posthuma and Van Der Sluis (2003). They find that the bias associated with backfilling hedge fund returns is approximately 4% annually.

While the literature has recognized the potential bias from incubation and the use of a total net assets filter to eliminate this bias is widespread, the bias has never been measured for

mutual funds nor has it been shown to affect mutual fund research. In this paper, I document both the magnitude and extent of the incubation bias in mutual fund returns and provide a simple filter to remove incubated fund data. I also show that the TNA filter, commonly applied to remove incubated fund data, does not achieve this aim and may induce an additional bias. Finally, I show how the incubation bias can affect common inferences in mutual fund research.

### **III. Data**

The sample consists of CRSP domestic equity mutual funds where the first date of return data is greater than or equal to January 1<sup>st</sup> of 1996. To ensure the sample consists of only domestic equity funds, I require funds in the sample to have an average of 90% or greater of their assets held in common stock (CRSP variable com) over the life of the fund. From this sample, I then remove all funds with non-U.S. investment objective codes (CRSP variables icdi\_obj, sp\_style\_cd and policy equal to C&I, GE, IE, AGF, DSC, EAP, EAX, ECH, EEU, EGA, EIA, EJP, ELA, ESC, SCI, SGL).

I merge this database with a list of mutual fund tickers and their creation date from the NASD.<sup>13</sup> The ticker creation date is the actual date that the NASD assigned a ticker to a particular fund. Because the ticker creation date data consists of annual snapshots of currently active tickers taken each January from 1999 to 2006, if a fund were terminated before 1999 or if a fund were started and terminated between the January snapshots, the fund would not have to be included in the NASD data. For this reason, I keep only those funds whose returns data begins in

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<sup>13</sup> This data is available from the author upon request.

January of 1996 or later, consistent with the 36-month return requirement imposed in the performance calculations.<sup>14</sup>

To assess whether or not a fund was incubated, I examine the difference between the ticker creation date and the date of the first reported monthly return for the fund.<sup>15</sup> If this difference is positive, it indicates a delay between the start of the fund and the application for and authorization of a ticker for the fund. For the sample described above, 16% of the sample has a zero-month difference, and 66% of the sample has a six-month or less difference between the two dates. Still, 10% of the sample has a difference of 25 months or greater. To separate incubated from non-incubated funds, I set a cutoff of 12 months. If there is a difference of greater than 12 months between the ticker creation date and the fund's inception date, I classify the fund as incubated and non-incubated otherwise.<sup>16</sup> Using this definition, 23.1% of the sample (242 out of 1048 funds) is incubated. I also use the ticker creation date to separate the incubation observations into incubation period (those observations with a date less than or equal to the ticker creation date) and post-incubation data (those observations with a date greater than the ticker creation date).

**[Table I Goes Here]**

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<sup>14</sup> Starting the analysis in January of 1996 is a compromise between a longer sample period length (1996 to 2005) and not imposing an additional survival requirement beyond the 36 months of returns already required to be included in the incubation bias calculation.

<sup>15</sup> In previous versions of the analysis I used the `first_offer_dt` as a proxy for the fund inception date. Unfortunately, this variable can have multiple reported values for the same fund and it isn't clear which value was correct.

<sup>16</sup> As an additional filter, I remove the 2.2% of the sample with a negative difference greater than three months. Three months is used as a cutoff because some fund families apply for the ticker before the fund is actually created. Those observations with a difference greater than three months are thrown out as they likely represent either an error in the ticker creation date data or an error in the ticker match.

Table I contains descriptive statistics for the sample. The table is separated into two sections describing the total net assets (TNA), expense ratio, turnover, and fund family total net assets for both the incubated and non-incubated fund samples. The incubated fund data is further separated into the incubation period (during incubation) and post-incubation period data. The table also includes the percentage of both types of funds with a front load and a rear load. The table shows that fund size during incubation is much lower with a median (mean) fund size of \$6.78 (\$38.75) million versus a post-incubation median size of \$30.00 (\$146.62) million or a non-incubated fund size of \$44.12 (\$142.68) million. While expense ratios and fund family size are similar across the three groups, turnover is lower for the incubated sample than either the post-incubation sample or the non-incubated sample. This is consistent with less flow-induced trading for funds in incubation. Last of all, the univariate statistics suggest that incubated funds are more likely to be sold with a load than non-incubated funds, once they are opened to the public.

## **IV. Results**

### *A. The Impact of Incubation on Performance*

In this section I examine the impact of incubation on fund performance by comparing the risk-adjusted performance of incubated and non-incubated funds. I also compare various risk measures of incubated and non-incubated funds. Tables II and III, respectively, contains the results from these analyses. Table II is separated into two panels. Panel A contains a comparison of the incubation period performance of incubated funds with the first 36 months of performance of non-incubated funds. Panel B compares the first 36 months of performance post-incubation for incubated funds with the first 36 months of performance for non-incubated funds.

Each panel has three columns. The first and second columns give the mean and median monthly performance of the incubated and non-incubated funds respectively.<sup>17</sup> The third column gives the annualized difference in the performance measure between the two.

**[Table II Goes Here]**

The return measures reported in the table include an investment objective alpha, the 4-, 3- and 1-factor alphas, Sharpe ratio and total return. The investment objective alpha is calculated by subtracting the equal-weighted average return of funds in the same investment objective from the fund's return. The 1-factor or Jensen's alpha is the excess return from the CAPM (Jensen (1968)). The 3-factor alpha is the excess return from the Fama-French 3-factor model (Fama and French (1993)) and the 4-factor alpha is the excess return from the Fama-French 3-factor model plus a momentum factor (Carhart (1997)). The asterisks characterize the statistical significance of the difference in mean and median from zero in the first two columns and the difference in the mean and median between the two groups in the third column.

Overall, there is a large percentage of funds that are incubated. Out of the 1048 new domestic equity funds in the sample, 242 or 23.1% of them are incubated. As the asterisks in column 3 of the table indicate, the difference in returns between the incubated and non-incubated funds is statistically significant in every case except for the 1-factor alpha. The mean (median) difference in total returns is 9.84% (9.31%) and the difference in the annualized mean (median) risk-adjusted measures ranges from 1.42% to 3.52% (1.14% to 2.32%) while the difference in mean (median) annualized Sharpe Ratio is 0.381 (0.419). Overall, this incubation period

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<sup>17</sup> While the length of the incubation period performance varies from fund to fund, I have repeated the analysis using the first 36 months for both the incubated and non-incubated samples with very similar results. These tests are available from the author upon request.

difference in performance between the incubated and non-incubated funds is strong evidence of a performance-enhancement motive for fund incubation.

In Panel B of Table II, the post-incubation performance of incubated funds is compared to the non-incubated funds. After incubation, the performance of incubated funds is very similar to non-incubated. The annualized differences in the mean and median of the investment objective alpha, the 4-factor and the 3-factor alpha are statistically insignificant and the Sharpe ratio of incubated funds is actually statistically significantly worse.

The statistically significantly outperformance in total return terms for incubated funds (9.84%) as well as the surprising post-incubation 1-factor alpha outperformance (2.93%) suggest that the results may be influenced by overall market conditions. To confirm that this is not driving the results, I have repeated the analysis in table II after removing all return observations during the market downturn (August 2000 to September 2002). While the results are not included here for the sake of brevity, incubated funds still outperform non-incubated funds in annualized risk-adjusted terms by 2.86%, but there is no statistically significant difference post-incubation. Removing those observations also eliminates the statistically significant difference in both the total return and 1-factor alpha results.

In their analysis of survivorship bias and its impact on performance persistence tests, Brown, Goetzmann, Ibbotson and Ross (1992) suggest that in a fund sample where there is dispersion in the total risk taken by manager, conditioning upon a performance survival threshold effectively conditions upon the risk taken by the manager. For similar reasons, it is possible that those funds that survive incubation and are opened to the public have taken greater risk during their incubation period than non-incubated funds or than the same funds post-incubation. Table

III provides a comparison of the total risk, idiosyncratic risk and factor loadings of incubated and non-incubated funds.

**[Table III Goes Here]**

The table gives the mean and median of the total risk (standard deviation of the excess return) and idiosyncratic risk (standard deviation of the 4-factor model residual) measures for each group. It also gives the mean and median of the market (Market Beta), book-to-market (HML), firm size (SMB) and momentum coefficients from the 4-factor model used in Table II. Panel A compares these values for incubated funds during incubation with non-incubated funds over the first 36 months of their existence. Panel B compares the risk measures for incubated funds calculated over the incubation period with those calculated over the first 36 months of post-incubation performance. In the last two columns, Difference Tests, the p-value for a difference in means and medians test between the groups in the first and second set of columns is reported.

As the table indicates there is no statistically significant difference between the mean of either the total risk or idiosyncratic risk measures of the incubated funds during incubation when compared to the non-incubated funds. Looking at the median, however, incubated funds during incubation have greater total risk when compared to themselves post-incubation or to the non-incubated funds (6.45% vs. 5.93% or 5.97% respectively) and they have greater idiosyncratic risk than the non-incubated funds (2.33% vs. 2.16%). Looking at the factor model coefficients we see that there is no statistically significant difference between the incubated funds during incubation and either the same funds post-incubation or the non-incubated funds for the market,

size and momentum coefficients. There is a statistically significant difference between the book-to-market coefficient for the incubated funds during incubation and the non-incubated funds, indicating a focus on value stocks that continues post-incubation. Overall, the differences in risk between incubated funds during incubation and non-incubated funds, although small, are consistent with the simulations of Brown et al that suggest conditioning upon a performance survival threshold effectively conditions upon the risk taken by the manager. While it might be surprising that the differences in risk during incubation and post-incubation are not larger, Pierce (1998) indicates that the SEC requires that incubated funds be managed in a similar fashion with respect to the investment strategy and the management practices post-incubation as the fund was managed during incubation. Given this requirement and previous SEC enforcement actions<sup>18</sup>, I would expect fund families to be sensitive to any differences in the risk of the strategy during incubation relative to post-incubation.

#### *B. The Impact of Incubation on Flows*

From the previous analysis it seems clear that incubation is used by families to enhance the performance of their fund product offerings. However, because the incubation period outperformance is reversed post-incubation, it isn't clear whether or not investors will give credence to these returns. To address this issue, I analyze the flows to both incubated and non-incubated funds and compare the response of these flows to performance, controlling for the other relevant factors. The results of this analysis are included in Table IV.

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<sup>18</sup> As an example, on September 8<sup>th</sup>, 1999, the SEC filed an enforcement action against Van Kampen Investment Advisory Corporation and Alan Sachtleben, the Chief Investment Officer of Van Kampen. The action was in respect to the Van Kampen Growth Fund that was incubated between December 27, 1995 and February 3, 1997. The fund had assets of \$380,000 during incubation and had invested in 31 IPOs. As a result, the fund's return for 1996 was over 60%. The SEC enforcement action was not due to the fact the fund was incubated, but rather it was due to the change in strategy of the fund post-incubation. Specifically, Van Kampen stated in the prospectus that "the Fund was managed substantially the same as if the Fund had opened for investment to all public investors" but post-incubation, the investment strategy had changed materially and the differences had not been disclosed to investors.

**[Table IV Goes Here]**

The dependent variable is annual net dollar flows to the fund, ranked by year and month. While previous analyses of flow typically focus on a percentage measure, I assign a fractional rank between 0 and 1 to each fund based on their net dollar flows for that year. There are two reasons for using a rank instead of a percentage number as the dependent variable. First, the relevant economic question for each period is which fund is attracting the greatest net dollar flows. Given the dramatic variation in the total net assets of younger funds, using a percentage can mask the true economic content of the data and the results can be driven by outliers. Second, there is substantial variation in the total net dollar flows to mutual funds year over year due to the unique sample period (1996 to 2005) and the turbulent market performance over that period. Ranking flows within each time period controls for this variation. To account for the well-documented relationship between flows and fund size or age, these variables are included in the regression.

The analysis is performed for the sample of domestic equity funds indentified previously over the life of the fund or until the end of the sample period, whichever comes first. For the non-incubated funds, the measurement of flows begins immediately after inception. For the incubated funds, flow data is included after the fund is opened to the public, as proxied for by the ticker creation date. Because the observations are overlapping, Newey-West (1987) standard errors are calculated with a 12 month lag.

In each specification, the independent variables include a dummy variable (ID) for the incubated and non-incubated funds. Also included are fund age, fund and family size, a dummy variable for whether or not the fund charges a load, the yearly fractional rank of the fund's

expense ratio and turnover relative to its investment objective, the fund's lagged annual net dollar flow rank and the concurrent flow rank of the fund's investment objective. To capture the performance of the fund, two different performance measures are used: the average monthly total return of the fund since inception and the average monthly return of the fund in excess of its investment objective since inception. With the exception of the dummy variables for the incubated and non-incubated funds, all other variables are demeaned to aid with the exposition.

In specification 1, only the dummy variables for incubated and non-incubated funds are included. Incubated funds have a higher net dollar flow rank than non-incubated funds (0.527 vs. 0.485) and the difference between the two, indicated at the bottom of the table, is statistically significant. Given the ranking procedure used to construct the dependent variable, we can interpret these results as the average net dollar flow percentile rank of the fund.

In specification 2, the first set of explanatory variables is added to the regression. The coefficients for the control variables in the regression are consistent with previous results in the literature. The size of the family has a positive impact on flows and larger funds have smaller flows (while this isn't significant in specification 2, it is significant in the remaining specifications). Additionally, funds with higher expenses or turnover relative to their investment objective have lower flows. While the sign on these variables is consistent with the previous literature, including them only increases the measured difference in net dollar flows between incubated and non-incubated funds (0.527 vs. 0.471). In specification 3, the fund's lagged net dollar flow rank is included. The importance of including lagged flow is that it is a general measure of investors' affinity for the fund. Without having to specify exactly which variables appeal to investors or how those variables are measured, past flow captures the appealing characteristics of the fund that are persistent. When lagged fund flows are included in the

regression, the difference in flows to incubated and non-incubated funds grows smaller but the difference remains marginally statistically significant with a p-value of 7.6%.

In specification 4 the concurrent investment objective net dollar flow rank is added to the regression. Table VI shows that flows to the investment objective are positively related with the probability of opening a new incubated fund in that investment objective. Given this evidence, it seems likely that the decision of which incubated funds to open to the public would be made in part based on the flows to the investment objective. Consistent with this notion, the average investment objective flow rank is positively related to fund flows and including this variable further decreases the difference in flows between incubated and non-incubated funds.

In specification 5 and 6, the cumulative total and relative return measures respectively are included. Both of these measures are positively related to flows and they help to explain the difference in flows between incubated and non-incubated funds. In the last specification, there is no statistically or economically significant difference between the flows to incubated and non-incubated funds.

Overall, the results from Table IV are intuitive. While incubated funds attract higher net dollar flows than non-incubated funds, these differences are explained by flows to the fund's investment objective and measures of the fund's performance and past flows. It seems from this evidence that investors do not differentiate between incubated and non-incubated fund performance and that they prefer incubated funds based on these characteristics.

### *C. The Family-Level Determinants of Fund Incubation*

In this section, I examine the family-level determinants of incubation and tables V and VI contain the results of this analysis. While the focus of these results is the same sample of newly initiated domestic equity funds from 1996 to 2005, the performance and risk results in tables II

and III are subject to a fund-level three-year return data requirement. The results in this section only require family-level and investment-objective level data from the previous year and as a result, the total number of incubated funds analyzed here is larger than the performance results (723 vs. 242), but the percentage of incubated vs. non-incubated new funds is similar (723 out of 2112 or 34% vs. 242 out of 1048 or 23%).

Table V contains the results from a univariate comparison of families who do and don't incubate. The table lists the average value for various fund family characteristics of the sample split into three groups. Columns 1 and 2 contain the results for non-incubating and incubating families and column 3 contains the results for those fund families that don't initiate any new equity funds during the sample period.

**[Table V Goes Here]**

Comparing the families that do and don't incubate, several patterns emerge. Families that incubate are larger and they initiate more funds, both incubated and non-incubated. Given the resources required to incubate multiple funds simultaneously, it is perhaps not surprising that larger families are more likely to incubate. If incubation is used to enhance performance we would expect incubated funds to be purchased by investors who focus on performance as opposed to fees or other fund characteristics. Consistent with this performance-enhancement explanation for incubation, families that incubate have more broker-sold assets (36.82% vs. 31.90%). We also see that families who incubate have a larger percentage of their assets in institutional share classes. Given the ability to convert private subaccounts into public fund products discussed earlier, we might expect families with more assets in institutional share

classes (a proxy for the number of privately managed subaccounts) to incubate more. If incubation was a mechanism to identify superior managers, we might expect families that incubate to have less manager turnover. However, the average manager tenure for families that incubate is lower (4.7 vs. 5.3 years) than families who don't incubate. Last of all, while the expense ratio and turnover numbers are similar for families that do and don't incubate, when the rank of these variables is calculated within investment objective, the results are very different. The turnover rank for families that incubate is higher, consistent with a focus on active management and performance competition. Given the larger average size of the fund family, we might expect the fund expense ratios of incubating families to be much lower than those of non-incubating families, but both are in the 42<sup>nd</sup> percentile. This is also consistent with a performance or active management focus or it may be an indication of the higher expenses incurred by families that incubate.

While the univariate results are intriguing, I also examine the determinants of mutual fund incubation in a multivariate framework. Khorana and Servaes (1999) have previously examined the likelihood of opening a new fund and they have shown that it depends on family-level characteristics such as family size and the number of funds opened by the family previously. I repeat the analysis of Khorana and Servaes, but in a multinomial probit regression where I separately examine the determinants of the decision to open an incubated and a non-incubated new fund, both relative to the decision of not opening a fund. The units of the dependent variable are fund family-investment objective-year and the dependent variable of the incubated fund equation is 1 if the family opens an incubated fund that year in the given investment objective and 0 otherwise. The dependent variable for the non-incubated fund

addition equation is determined similarly. Calendar year fixed effects are included and the standard errors are clustered by fund family. Table VI contains the results of this analysis.

**[Table VI Goes Here]**

The first column of coefficients is the determinants of adding a new non-incubated fund and the second column is the determinants of adding a new incubated fund. The table lists the coefficient, its statistical significance and the p-value of a difference test between the incubated and non-incubated coefficients. The first set of results or New Equity Funds sample, are for the domestic equity sample analyzed in the previous tables. Khorana and Servaes also repeat their analysis separately for bond funds and find a number of differences. To ensure robustness, the second set of results or the All Funds sample is for a larger sample that also includes bond and international equity funds.

The independent variables in the selection equation include the rank of the net dollar flow over the previous 12 months into the investment objective (Inv. Obj. Flow Rank), into the family overall (Family Flow Rank) and into the current family offerings in that specific investment objective (Family Inv. Obj. Flow Rank). As measures of performance, the return in excess of the investment objective average for the fund family overall (Avg. Family Excess Return) as well as for the family's offerings in that particular investment objective (Family Inv. Obj. Excess Return) are included. The size measures include the log of the total TNA invested in the investment objective across families (Log(Inv. Obj. TNA)), invested in the family (Log(Family TNA)) and percent of the family's assets in that investment objective (Percent Assets in Inv. Obj.) as well as a dummy variable for whether or not a large fund family (95<sup>th</sup> percentile or

above of family TNA) opened a fund in that investment objective in the previous year. To assess the tendency of the family to open new products and the family's response to changes in other families offerings, the number of new funds and new incubated funds opened by the fund family in the previous year and the percentage change in the total number of share classes available from all fund families in the investment objective from the previous year are also included. The percent of the families' assets that are in institutional funds (Percent of Family TNA in Institutional Funds), a dummy variable for whether the family is predominantly broker-sold (Load Fund Family ID), the average tenure for managers in the family (Avg. Manager Tenure), and the percent of family TNA in index funds (Percent of Family TNA in Index Funds) are also included.

The results are generally supportive of the results of Khorana and Servaes. Consistent with fund families acting to satisfy investor demand, families are more likely to open new funds in investment objectives where the dollar flows in the recent year and the total assets in the investment objective are high. Khorana and Servaes argue that economies of scale in part drive the decision to open new funds. These results also support this idea in that large families are more likely to open new funds. The results also suggest that families where the excess returns of their current fund offerings in the investment objective are worse are more likely to open a fund, consistent with families wanting to maximize the performance of their fund offerings. Last of all, inconsistent with the idea of increasing fund offering breadth but consistent with a desire to specialize, families with a large percent of their assets in a given investment objective are more likely to open an additional fund in that investment objective.

In addition to the individual coefficients and their significance, the table also lists the p-value of a difference in coefficients test across the incubated and non-incubated specifications.

Looking at both the New Equity Funds results and the All Funds results, there are few statistically significant differences. However, those coefficients that are different are insightful as to what type of family incubates. Families that are primarily broker-sold are more likely to open new funds through incubation. Given the evidence that flows through brokered channels exhibit higher sensitivity to performance (i.e. O’Neal, 2004 and Bergstresser, Chalmers and Tufano, 2009) than non-brokered channels, this would also be consistent with a performance enhancement motive. More directly to the motive of increasing flows; the decision to open an incubated fund is more sensitive to the family’s flows to existing fund offerings in the same investment objective than the decision to open a non-incubated fund. While this difference is only marginally statistically significant in the New Equity Funds sample, it is strongly significant in the All Funds sample.

Massa (2003) argues that fund proliferation is an alternative to performance competition. As the total number of fund offerings and combinations of different fee schedules increase in an investment objective it is harder to differentiate fund offerings based on performance. By including the prior year’s percentage change in the total number of share classes available in a given investment objective I am able to proxy for fund proliferation.<sup>19</sup> The negative coefficient for incubated fund addition is consistent with Massa’s argument that families are less likely to compete on the basis of performance in an investment objective with higher fund proliferation. While the evidence regarding incubated fund performance suggests that incubation is used for performance competition, the addition of a non-incubated fund may be used to compete on the basis of performance, fees or other fund characteristics. Consistent with multiple reasons for

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<sup>19</sup> Using the change in the number of share classes as a proxy for fund proliferation is also more likely to capture non-performance related fund proliferation. Because a new share class will have the same gross performance as previously existing share classes of the same fund, it is less likely that it was added to compete on the basis of performance.

non-incubated fund addition, the coefficient on this variable is not statistically different from zero.

While we do not observe the number of privately managed accounts for a given fund family, I use the percent of family TNA in institutional funds as a proxy. Given the previous discussion of incubation through private account conversion, it is perhaps not surprising that families with a larger fraction of their TNA in institutional funds are more likely to incubate. Last of all, those families that have incubated in the past are more likely to incubate in the future. Overall, the picture that emerges is consistent with the notion that families use incubation to enhance the performance and therefore the net flows of their fund offerings.

#### *D. The Incubation Bias*

While incubation has been discussed in the literature and the use of a total net assets filter to eliminate the bias is commonplace, the bias has not been measured for mutual funds nor has its impact on mutual fund research been documented. In this section, I provide an estimate of the incubation bias and document its impact on mutual fund inferences regarding performance, fund size and fund flows. I also examine three potential filters and their effectiveness in eliminating the bias.

To document the incubation bias, I revisit the results in Table II. These results can be interpreted as a test for an incubation bias under the null hypothesis that incubated and non-incubated funds exhibit no difference in risk-adjusted performance.<sup>20</sup> The documented outperformance of incubated funds by 3.5% during incubation and the statistically insignificant difference in performance post-incubation are strong evidence that including incubation period

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<sup>20</sup> An alternative way to structure this test is compare the incubation period performance of surviving incubated funds to the performance of those funds that were incubated, but never opened to the public. Unfortunately, only those funds that survive the incubation process and are eventually opened to the public appear in the data, so I use the non-incubated, publicly initiated funds as a control sample.

returns biases fund returns upwards. Because the results in Table II only examine new funds, I also estimate the impact of an incubation bias on aggregate mutual fund performance in table VII.

**[Table VII Goes Here]**

Table VII provides performance estimates for the aggregate domestic equity sample with and without incubation period observations. While the rest of the paper uses the ticker creation date data from 1996 to 2005, in this analysis I also include the 2006 and 2007 data. By including these two additional years of data, those funds that were in incubation during 2005 or earlier but that were not opened to the public until 2006 or 2007 will be included in the analysis. Funds that were in incubation anytime between 1996 and 2005, but that were not opened to the public until 2008 or later are excluded from the analysis.

The annualized performance measures include 4-factor alphas, equal-weighted and value-weighted average total returns. Including incubation period performance upwardly biases the 4-factor alpha and equal-weighted average return measures by 0.43% and 0.84% respectively and both of these differences are statistically significant. Comparing the value-weighted average returns, however, there is little or no difference in performance. Given the smaller size of incubated funds during incubation and the consequently smaller weight associated with the incubation period returns, this result is perhaps not surprising.

Looking at the year by year results, the percent of incubated observations and the impact of incubation on aggregate fund performance are both larger in the early part of the sample. Two possible explanations for this decrease are backfilling and a shift in competitive strategy. With

respect to backfilling, the returns of funds that were in incubation earlier in the sample and that having already been opened to the public are included in the database. Those funds that were incubated later and consequently were not yet open to the public at the end of the sample won't be included in the data because their returns have not yet been backfilled. This should give rise to a decrease in the observed percentage of incubation period observations later in the sample. To address this issue, I have included an additional 24 months of ticker creation date data (2006 and 2007) in the analysis. Even after including the additional data this decreasing trend is evident.

Another possible explanation for this decrease is a shift in family strategy away from performance competition. As I discussed in the previous section, Massa (2003) argues that fund proliferation and fee differentiation are alternatives to performance competition. As the total number of funds and differential fee structures increase, the effectiveness of performance competition declines. The results from table VI support Massa's argument for incubated fund addition. As the number of share classes in a given investment objective increases, the probability of incubating a fund in that investment objective declines. While these results don't characterize the aggregate trend regarding fund proliferation, they do suggest that an increase in the number of funds or share classes would decrease incubation. According to the Investment Company Institute 2005 Factbook, between 1996 and 2004 the total number of mutual funds increased 28.7% from 6,248 to 8,044. Over the same time period, the number of fund share classes, a measure of fee differentiation, increased 93.5%, from 10,352 to 20,036. Given the fund proliferation and the increase in differential fee structures over the sample period, the decline in incubation is consistent with families shifting away from incubation as a strategy for performance competition .

In spite of the decline in the bias over time, the evidence from the aggregate performance measures in table VII and from the sample of new funds in table II indicate that including incubation period returns imparts an upward bias in returns. I now examine the impact of this bias by revisiting two influential results in the literature: the flow-performance analysis of Sirri and Tufano (1998) and the size-performance analysis of Chen, Hong, Huang and Kubik (2004).

*1. Incubation and Tests of the Fund Flow-Performance Relationship*

In this section I revisit the Sirri and Tufano (1998) analysis of fund flow and performance including and excluding incubation period observations. I follow the framework used by Sirri and Tufano (1998), with two exceptions. First, Sirri and Tufano (1998) examine non-overlapping annual observations from 1971 to 1990 whereas my analysis consists of overlapping monthly observations from 1998 to 2005. While I use the same Fama and Macbeth (1973) cross-sectional regression framework as Sirri and Tufano, I calculate Newey-West (1987) standard errors with a 12 month lag to account for the overlapping observations. Second, the Sirri and Tufano fund sample only includes domestic equity funds from the aggressive growth, growth and income and long-term growth investment objectives. Because the investment objective codes change over our sample period, I use the procedure described in section II to isolate a domestic equity sample. The results of this analysis are included in Table VIII.

**[Table VIII Goes Here]**

The dependent variable is annual percentage flow. I use two performance measures; total return and 1-factor or Jensen's (1968) alpha calculated over the previous 12 months. I separate performance into high, medium and low categories, where high refers to the top quintile of

performance (quintile 1), medium to the middle-three quintiles (quintiles 2–4), and low refers to the bottom quintile of performance (quintile 5). The performance measurement used in the analysis is the fund's fractional rank, where the rank is calculated using either the total return (TotRetRank) or Jensen's alpha (1-FactorAlphaRank) for all funds in the sample for a given year and month. The low-, medium- and high-performance measures are calculated as  $TotRetRankLow = \min(0.2, TotRetRank)$ ,  $TotRetRankMed = \min(0.6, TotRetRank - TotRetRnkLow)$  and  $TotRetRankHigh = \min(0.2, TotRetRank - TotRetRankMed - TotRetRankLow)$  to create a piece-wise linear specification. The other independent variables in the regression include an intercept, the log of the fund's TNA, the contemporaneous annual flows to the fund's investment objective (in percentage), the total expenses of the fund (defined as the expense ratio plus the dollar-weighted average load of the fund amortized over seven years), and the standard deviation of the fund's monthly returns over the previous 12 months.

Table VIII presents the results for regression when incubation period data is included (Full Sample) and when incubation period fund data is removed (No Incubated). For non-incubated funds, flow data from the first year after inception would not be included in the regression because the independent variables include a lagged performance measure calculated over the previous year. Non-incubated flow data from the second year would be included and it would be regressed on the performance measures calculated over the first year. For incubated funds, however, the first year of flow data post-incubation is included because they have a prior track record. The regression framework in table VIII will examine the impact of including this additional flow and performance data for incubated funds.

The total return results are similar in sign and statistical significance to the results reported in Sirri and Tufano (1998) except that there is a statistically significant relationship

between flow and the medium-performance measures. The convex relationship between flow and performance, however, is still evident. Looking at the No Incubated sample results, when the incubated fund data is removed, the relationship between flow and performance is not as convex. In particular, the coefficient on high performance (TotRetRankHigh) drops from 3.49 to 3.28 and the difference, as indicated by the p-value in the Coef. Diff. column, is statistically significant at a 10% level. Looking at the 1-Factor or Jensen's (1968) alpha results, we also see a drop in the high- (from 3.10 to 2.85) and medium-performance (from 0.66 to 0.61) coefficients that is significant at the 10% level.

Because incubated funds have upward-biased performance, the majority of the incubated observations in the regression will fall in the high- and medium-performance categories. Because the average size of incubated funds right after incubation is small, the percentage flows are large relative to other observations. Looking at the sample statistics of the funds in the regression, the average (median) monthly net percentage flows of the incubated funds for the first year post-incubation is 14.2% (1.50%) versus 4.8% (0.18%) for all other observations. The dollar flows, however, present a very different picture. The average (median) monthly net dollar flows is \$3.91 million (\$0.07 million) for the incubated funds for the first year post-incubation and it is \$3.38 million (\$0.17 million) for all other observations. Combining the artificially high performance of incubated funds with the high percentage flows, the relationship between fund flow and fund performance is overstated. Removing the incubation period fund data gives a more accurate estimate of this relationship.

## *2. Incubation and Tests of the Fund Size-Performance Relationship*

I also revisit the Chen, Hong, Huang and Kubik (2004) analysis of fund size and performance including and excluding incubation period data. I follow the same methodology as

Chen et al with two exceptions. First, while Chen et al use the Fama and MacBeth (1973) regression approach for a monthly overlapping sample from 1962 to 1999, I use a panel regression approach with yearly fixed effects interacted with investment objective and clustering standard errors by mutual fund for a monthly overlapping sample from 1998 to 2005.<sup>21</sup> Second, while I also limit my sample to domestic equity funds, the procedure for doing this is slightly different than Chen et al due to differences in the investment objective codes over the two samples. The results from this analysis are included in table IX.

**[Table IX Goes Here]**

Two different measures of monthly fund performance are used in the regression; 1-factor alpha (Jensen, 1968) and 4-factor alpha (Fama and French, 1993 and Carhart, 1997). To estimate these risk-adjusted measures, I follow the methodology of Chen et al by separating the sample into size quintiles each month and then pooling all of the time series and cross-sectional observations in each size quintile in order to calculate a set of factor loadings. I then use these factor loadings to calculate the monthly 1- and 4-factor alphas. I regress these performance measures on the past performance over the previous 12 months and lagged values of the log of the fund's total net assets (Log(TNA)), the log of family total net assets (Log(Family TNA)), the fund's turnover ratio (Turnover), fund age in years (Age), the fund's expenses (Expenses), the share-class value-weighted fund load (Load), fund flow over the previous year (Flow), and an intercept. The table contains two sets of results for each regression specification; the first using

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<sup>21</sup> I have also run the regression using the Fama and MacBeth (1973) framework employed by Chen, Hong, Huang and Kubik (2004). While removing incubation period data changes the coefficient on fund size in the same direction and by approximately the same magnitude as the panel regression analysis used here, I fail to find any statistically significant relationship between fund size and performance using either the full sample or the incubation filtered sample. This may be due in part to the much shorter sample used here relative to the sample in Chen, Hong, Huang and Kubik (96 monthly cross-sections versus 432 monthly cross-sections).

the full sample (Full Sample), and the second using the sample with incubation period data removed (No Incubated). The table also reports the total number of observations, the number of clusters, the p-value of a test of the equivalence of the size (Log(TNA)) coefficient across the full sample and the incubation data filtered sample, and the r-squared of the regression.

The results in Table IX are roughly consistent with the findings of Chen et al. The coefficient on lagged performance is positive and statistically significant. The coefficient on fund size is negative and statistically significant, and the coefficient on fund family size is positive and marginally statistically significant. One minor difference is that in Table IX the coefficient on age is positive and statistically significant, but it is negative and statistically insignificant in Chen et al.

Comparing the fund size coefficients between the full sample and incubation filtered samples, we see that the negative relationship between size and performance is less pronounced once the incubation period data is removed. As can be seen from the p-value of the difference in coefficients between the full and non-incubated samples, this difference is statistically significant. The impact of incubation on the fund-size and performance relationship is clear from previous evidence in the paper. Table I shows that incubated funds have below average TNA during incubation but post-incubation they have average TNA. Table II shows that incubated funds have above average performance during incubation but average performance post-incubation. By including incubation period data, the shift from small funds with artificially high performance during incubation to average size funds with average performance after incubation overstates the negative relationship between fund size and performance. Removing the incubation period data in the analysis results in a less pronounced negative relationship between fund size and performance.

### 3. *Incubation Filters*

It is clear from the previous examples that the incubation bias can affect inference regarding mutual funds. To address this issue, researchers often remove funds below a certain size or funds below a certain age. In this paper, I propose an additional filter of removing all data before a fund's ticker creation date (data generated between the fund's inception date and the fund's ticker creation date) as a solution. Table X contains a comparison of these three filters and their impact on the bias. Panel A and Panel B contain the unfiltered results and the ticker creation date filtered data respectively. These results are the same as in Table II and are provided here only for comparison. Panel C contains the sample with an age filter of three years applied to the data. Panel D contains the TNA filter (i.e., funds below a given size are removed from the sample), applied to both the incubated and non-incubated funds. The panel is split into two groups: funds with total net assets greater than or equal to \$25 million and those with total net assets less than \$25 million calculated at the end of the 36-month performance window.

**[Table X Goes Here]**

The format of Table X is similar to that of Table II. The monthly mean and median of each performance measure is provided along with the annualized difference between the incubated and non-incubated performance. Applying the ticker creation date filter in Panel B removes the bias as measured by the investment objective alpha, the 4-factor alpha and the 3-factor alpha measures. The 1-factor alpha is still statistically different as was previously discussed in Table II. The age filter in Panel C also seems to eliminate the bias, although it

removes both non-incubated and incubated data.<sup>22</sup> While the ticker creation date data is only available for funds that were alive in 1999 or later, the age filter can be applied to earlier samples as well. It is also interesting to examine the results in Panels A and C in light of the industry perception that younger funds outperform.<sup>23</sup> While younger non-incubated funds do outperform the older sample, it appears that the incubated younger fund sample is largely driving this outperformance.

Given the widespread use of the TNA filter in mutual fund research, I examine the impact of this filter on the incubation bias in Panel D. The panel is divided into funds with TNA greater than or equal to \$25 million after 36 months of available performance data and those with less than \$25 million. Looking at the non-incubated funds, 197 of the 806 funds or 24% are excluded by the filter. In unreported tests, I find that the performance of these non-incubated funds is statistically significantly worse than the non-incubated funds that are not excluded by the TNA filter. Given the relationship between performance and flows documented by Ippolito (1992), Chevalier and Ellison (1997), Sirri and Tufano (1998), and others, this bias in returns induced by the TNA filter is not surprising. The worst-performing funds will also have minimal assets under management owing to both the compounding effect of poor performance and the lack of inflows.

We also see in Panel D, that the TNA filter does not remove all of the incubated funds. Over 50% (129 out of 242) of the incubated funds have TNA greater than \$25 million after three years. Comparing the performance of the incubated and the non-incubated funds that remain after the TNA filter is applied, the difference in performance is both economically and

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<sup>22</sup> The smaller sample size in Panel C is due to the time restrictions of the sample. To be included in the original sample of 1048 incubated and non-incubated funds, the only requirement was 36 months of post-creation date data. The age filter applies an additional requirement of 72 total months of performance data.

<sup>23</sup> For example, see Steven Goldberg's article "For Funds, New Often Means Better". (Kiplinger.com, June 16, 2008).

statistically significant. The annualized difference in risk-adjusted performance between the two groups is between 4.80% and 5.67%.

The inability of the TNA filter to remove the incubation bias may be, in part, because of private incubation. With private incubation, the incubated funds are unregistered private accounts that manage assets for other clients. As a result, the privately incubated funds have more assets under management than a typical publicly incubated fund.

## **V. Conclusion**

In this paper, I document the role that incubation plays in the development of new mutual funds. For a comprehensive sample of newly created US domestic equity funds between 1996 and 2005, approximately 23% of new funds were incubated. I show that incubation is used as a tool for performance-competition. Relative to a non-incubated control sample, these funds outperform on a risk-adjusted basis by 3.5% and their Sharpe ratio was more than double. Also consistent with a performance-competition motive for incubation, families that sell through a brokered channel and have less flow to their existing fund offerings in the same investment objective are more likely to incubate.

While incubated funds outperform during their incubation period, post-incubation there is no statistically significant outperformance relative to non-incubated funds. This performance reversal suggests that incubation is not used to identify superior managers or strategies, but rather the incubation period outperformance is contrived. In spite of this reversal, investors respond to incubation period performance and incubation is an effective mechanism for increasing fund flows. Incubated funds have higher net dollar flows than non-incubated funds, but once fund performance, past flows and concurrent flows to the investment objective are

included in the analysis, there is no statistically or economically significant difference in flows. This suggests that incubation is an effective strategy, in part, because investors don't distinguish between incubated and non-incubated fund performance.

The strategy of incubation also has important implications for researchers who work with mutual fund data. Because incubated funds have upward-biased returns during incubation but average returns post-incubation, there is potential for incubation to affect tests of mutual fund performance. To illustrate this potential, I examine the role of incubation in tests of the flow-performance and performance-size relationships. I find that including incubated funds in flow-performance regressions overstates the relationship between flows and good performance. Because incubated funds have few assets under management immediately after incubation and therefore a smaller denominator in percentage calculations, these percentage flow observations are larger in spite of having similar dollar flows to both non-incubated funds and incubated funds more than a year removed from incubation. The combination of these unusually large percentage flows with their upward-biased performance affects tests of the flow-performance relationship.

I also examine the impact of incubation on tests of fund size and performance. Because incubated funds tend to be small during incubation with above average performance but larger post-incubation with average performance, we would expect to observe a negative relationship between fund size and performance in samples of incubated funds. I find that removing incubation period data from the sample weakens the observed negative relationship between size and performance.

The flow-performance and performance-size results suggest that controlling for incubation is important. I examine three filters that can be applied to the data in order to

eliminate this bias. When the ticker-creation date filter is applied, the return difference is eliminated. Likewise, when an age filter is applied to the data, it also resolves the problem but both incubated and non-incubated return data are removed. The filter most commonly applied in the literature is a TNA filter. This filter, however, does not eliminate the bias and actually induces an additional bias in returns.

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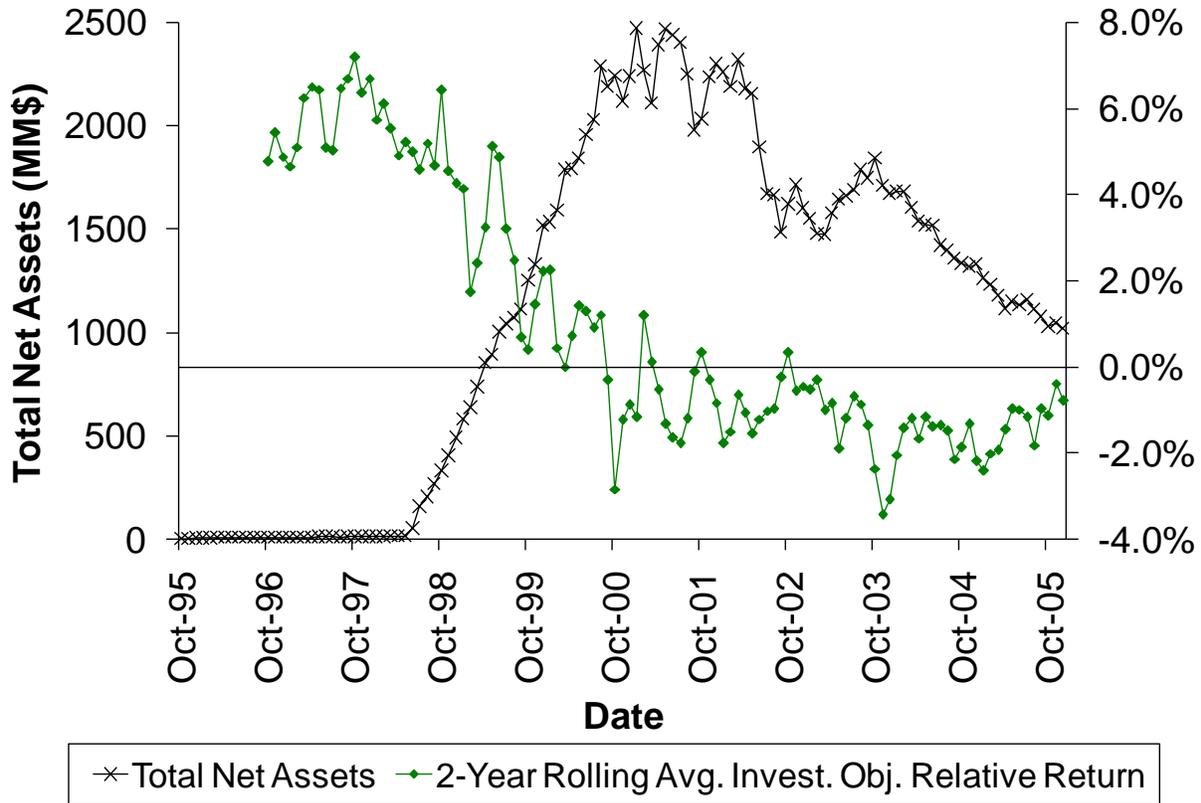
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**Figure 1. Putnam Research Fund – Total Net Assets and Performance**

Figure 1 reports the performance and total net assets (in millions of dollars) for the Putnam Research Fund. The left vertical axis indexes the size of the fund in millions of dollars. The right vertical axis indexes the 2-year centered average investment objective relative return. This return is calculated as the difference between the fund return and the average return of all mutual funds in CRSP with the same detailed investment objective code as designated by Standard and Poors. The horizontal axis shows the date of the observation.



## Table I. Descriptive Statistics

Table I contains descriptive statistics of the incubated and non-incubated funds. The sample statistics for the incubated funds are separated into during and post-incubation periods. The mean and median are reported for the total net assets of the fund (\$MM), expense ratio (%), turnover (%) and the fund family's total net assets (\$BB). The table also reports the percent of funds with a front and rear load.

Variable	Incubated Funds				Non-Incubated Funds	
	During Incubation (10116 Obs.)		Post-Incubation (11688 Obs.)		(35161 Obs.)	
	Mean	Median	Mean	Median	Mean	Median
Total Net Assets (\$MM)	\$38.75	\$6.78	\$146.62	\$30.00	\$142.68	\$44.12
Expense Ratio	1.54%	1.50%	1.53%	1.50%	1.48%	1.47%
Turnover	97.4%	71.9%	111.2%	82.9%	181.6%	72.0%
Fund Family TNA (\$BB)	\$202.71	\$16.17	\$246.72	\$22.69	\$181.60	\$30.74
% of Funds w/ Front Load	48.03%				44.22%	
% of Funds w/ Rear Load	51.50%				46.55%	

**Table II. Incubated and Non-incubated Fund Performance**

Table II provides descriptive statistics of various return measures for incubated and non-incubated funds. The mean, median, and asterisks that indicate the statistical significance of each value from a two-sided t-test and a sign test of the difference of the variable from 0 are reported. The table also reports the annualized difference between the mean and median values and asterisks that indicate the statistical significance of the differences from a two sample t-test and a non-parametric alternative, the Wilcoxon rank-sum test. The asterisks denote statistical significance as follows: \*\*\* - significant at 0.1%, \*\* - significant at 1%, and \* - significant at 5%. Panel A. compares the incubation period performance of incubated funds to non-incubated funds. Panel B. compares the post-incubation period performance of incubated funds to non-incubated funds. Five return measures are calculated: investment objective alpha, 4-factor alpha, 3-factor alpha, 1-factor alpha, and the total return. The statistics are given in units of percentage per month. The investment objective alpha is the fund average return less the average return for all funds with the same investment objective as identified by CRSP. The 1-factor alpha is Jensen's (1968) alpha. The 3-factor alpha uses the 3 factor model of Fama and French (1993). The 4-factor alpha combines the 3 Fama-French (1993) factors with a momentum factor (Carhart, 1997). The Sharpe ratio was first proposed by Sharpe (1966).

**Panel A. - Incubation Period Performance**

Variable	Incubated Funds (242 Funds)		Non-Incubated Funds (806 Funds)		Annualized Difference in	
	t=Incubation Period		t=1 to 36 Months		Mean	
	Mean	Median	Mean	Median	Mean	Median
Investment Obj. Alpha	0.29% ***	0.19% ***	0.08% **	0.06% *	2.56% ***	1.54% ***
4-Factor Alpha	0.35% ***	0.19% ***	0.06% *	-0.01%	3.50% ***	2.32% ***
3-Factor Alpha	0.36% ***	0.17% ***	0.07% *	-0.01%	3.52% ***	2.15% ***
1-Factor Alpha	0.23% ***	0.13% *	0.11% ***	0.04%	1.42%	1.14%
Sharpe Ratio	0.175 ***	0.198 ***	0.065 ***	0.077 ***	0.381 ***	0.419 ***
Total Return	1.44% ***	1.51% ***	0.62% ***	0.73% ***	9.84% ***	9.31% ***

**Panel B. - Post Incubation Period Performance**

Variable	Incubated Funds (242 Funds)		Non-Incubated Funds (806 Funds)		Annualized Difference in	
	t=1 to 36 Post Incub.		t=1 to 36 Months		Mean	
	Mean	Median	Mean	Median	Mean	Median
Investment Obj. Alpha	0.16% ***	0.08%	0.08% **	0.06% *	0.92%	0.21%
4-Factor Alpha	0.06%	-0.04%	0.06% *	-0.01%	0.03%	-0.36%
3-Factor Alpha	0.09% *	-0.03%	0.07% *	-0.01%	0.33%	-0.21%
1-Factor Alpha	0.36% ***	0.21% ***	0.11% ***	0.04%	2.93% ***	2.04% ***
Sharpe Ratio	0.023	0.016	0.065 ***	0.077 ***	-0.146 ***	-0.211 ***
Total Return	0.36% ***	0.38% ***	0.62% ***	0.73% ***	-3.17% **	-4.21% ***

**Table III. Risk Characteristics**

Table III provides descriptive statistics of various risk measures for both incubated and non-incubated funds. The table gives the mean and median for each sample of the fund's excess return (return minus risk-free rate) standard deviation, 4-factor model (Carhart, 1997) residual standard deviation, market beta, high minus low book-to-market factor loading (HML), small minus big market capitalization factor loading (SMB) and momentum factor loading. Next to the mean and median are asterisks that indicate the statistical significance of each value from a two-sided t-test and a sign test. The asterisks denote statistical significance as follows: \*\*\* - significant at 0.1%, \*\* - significant at 1%, and \* - significant at 5%. The table is divided into two panels. Panel A gives the risk measures for incubated funds during incubation and for non-incubated funds during the first 36 months after inception. Panel B gives the risk measures for incubated fund calculated during incubation and calculated over the first 36 months post-incubation. The table also reports the p-values for the difference in the variable for the two groups listed in each panel. The p-values are for a two sample t-test and a non-parametric alternative, the Wilcoxon rank-sum test.

**Panel A. - Incubated and Non-Incubated Fund Risk Measures**

Variables	Incubated Funds (242 Funds)		Non-Incubated Funds (806 Funds)		Difference Tests p-Values	
	t=Incubation Period		t=1 to 36 Months		t-Test	Non-param.
Standard Deviation - Excess Return	6.95% ***	6.45% ***	7.00% ***	5.97% ***	0.790	0.016
Standard Deviation - 4-Factor Residual	2.54% ***	2.33% ***	2.46% ***	2.16% ***	0.419	0.019
Market Beta	1.005 ***	1.009 ***	1.031 ***	0.996 ***	0.170	0.753
HML Coefficient	0.102 ***	0.118 ***	0.025	0.043 **	0.027	0.041
SMB Coefficient	0.228 ***	0.149 ***	0.215 ***	0.134 ***	0.639	0.745
Momentum Coefficient	0.021	-0.003	0.015 *	0.003	0.738	0.547

**Panel B. - Incubation Period vs. Post-Incubation Period Risk Measures**

Variables	Incubated Funds (242 Funds)				Difference Tests p-Values	
	t=Incubation Period		Post Incub. t=1 to 36 Months		t-Test	Non-param.
Standard Deviation - Excess Return	6.95% ***	6.45% ***	6.87% ***	5.93% ***	0.751	0.015
Standard Deviation - 4-Factor Residual	2.54% ***	2.33% ***	2.44% ***	2.11% ***	0.371	0.069
Market Beta	1.005 ***	1.009 ***	1.007 ***	0.979 ***	0.938	0.555
HML Coefficient	0.102 ***	0.118 ***	0.077 **	0.057 **	0.569	0.651
SMB Coefficient	0.228 ***	0.149 ***	0.215 ***	0.167 ***	0.704	0.778
Momentum Coefficient	0.021	-0.003	0.028 **	0.024	0.736	0.228

**Table IV. Investor Flows and Incubated Fund Returns**

Table IV gives the coefficients from a regression of investor flows on performance and fund characteristics including whether or not the fund was incubated. The dependent variable is the net dollar flows to the fund over the previous 12 months, ranked by year and month. Each fund is assigned a fraction rank between 0 (lowest) and 1 (highest) based on their net dollar flows for that year. For the non-incubated funds, the flow data begins after 12 months in order to have measures of performance, size, etc. For the incubated funds, flow data is included after the fund is opened to the public, as proxied for by the ticker creation date. The independent variables include a dummy for the average level of flow into incubated and non-incubated funds (ID – Incubated/Non-incubated), the fund’s age in years, the log of the fund’s total net assets (Log(TNA)) and the fund family’s total net assets, a no-load fund dummy and the yearly fractional rank (between 0, low, and 1, high) of the fund’s expense ratio and turnover relative to its investment objective. Also included is the fund’s previous year’s annual net dollar flow rank, the concurrent investment objective average dollar flow rank, the fund’s cumulative total return since inception and the fund’s cumulative relative return (minus the average return for all other funds in the investment objective over the same period). In addition to the coefficient estimates, the table reports the adjusted r-squared, total number of observations and the p-value from a difference test between the dummy (ID) variables for incubated and non-incubated funds. With the exception of these dummy variables (ID- Non-Incubated/Incubated) all other variables are demeaned for ease of interpretation. Annual fixed effects are included in the regression and Newey West (1987) standard errors are calculated with a 12 month lag. The asterisks denote statistical significance of the coefficients as follows: \*\*\* - significant at 0.1%, \*\* - significant at 1%, and \* - significant at 5%.

<b>Variables</b>	<b><u>1</u></b>	<b><u>2</u></b>	<b><u>3</u></b>	<b><u>4</u></b>	<b><u>5</u></b>	<b><u>6</u></b>
ID - Non-Incubated	0.485 ***	0.471 ***	0.487 ***	0.488 ***	0.489 ***	0.491 ***
ID - Incubated	0.527 ***	0.527 ***	0.503 ***	0.499 ***	0.495 ***	0.493 ***
Fund Age		-0.001 ***	0.000 *	0.000	0.000	0.000
Log(TNA)		0.005	-0.023 ***	-0.025 ***	-0.027 ***	-0.028 ***
Log(Family TNA)		0.006 ***	0.005 **	0.005 **	0.006 ***	0.006 ***
Load Fund Indicator		0.021 *	0.012	0.012	0.012	0.011
Expense Ratio Rank		-0.068 **	-0.077 ***	-0.074 ***	-0.076 ***	-0.076 ***
Turnover Rank		-0.042 **	-0.033 *	-0.032 *	-0.038 **	-0.042 **
Fund Annual Flow Rank(t-1)			0.429 ***	0.429 ***	0.422 ***	0.413 ***
Inv. Obj. Avg. Flow Rank (t)				0.618 ***	0.549 ***	0.620 ***
Cumulative Total Return					1.06 ***	
Cum. Relative Return						2.62 ***
Adjusted R-Squared	70.54%	71.01%	75.83%	75.94%	76.01%	76.14%
Observations	39,021	39,021	39,021	39,021	39,021	39,021
Annual Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Difference in ID p-values Incub vs. Non-Incub	<0.001	<0.001	0.076	0.226	0.520	0.764

**Table V. Fund Family Characteristics**

Table V provides descriptive statistics of various fund family characteristics when the sample is split by frequency of incubation. The table is split into three columns representing those families that do not incubate, those that incubate and those that do not initiate new equity funds during the sample. The unit of observation is the fund family and each observation represents the average across time for a given fund family. These observations are then averaged within the three groups in the table. The variables included in the table are the incubation rate or percent of new funds incubated, the number of new funds that a fund family opens each year, the number of new incubated funds that the family opens each year, the average fund family size, the percent of funds in the family that have either a front or back load, the percent of funds that are passive as indicated by the word “Index” in the fund name, the percent of the funds in the family that are institutional as indicated by the words “Institutional”, “Instl” or the share class designation “/I” and the average manager tenure of the fund family in years. The table also reports the average expense ratio and turnover for the funds in the family and the average percentile of these quantities where the percentiles are calculated within each fund’s investment objective.

<b>Variable</b>	<b>No Incubation Mean</b>	<b>Incubation Mean</b>	<b>No New Funds Mean</b>
Percent of New Funds Incubated	0%	33.74%	-
Average Number of New Funds	3.36	11.05	-
Average Number of Incubated Funds	0.00	3.73	-
Fund Family Size (\$ Millions)	\$7,516	\$22,524	\$707
Percent of Funds with Load	31.90%	36.82%	32.08%
Percent of Funds that are Passive	2.67%	1.73%	1.56%
Percent of Funds that are Institutional	26.71%	31.00%	18.06%
Average Manager Tenure (Years)	5.3	4.7	6.1
Expense Ratio	1.21%	1.13%	1.50%
Expense Rank (percentile)	42nd	42nd	51st
Turnover	82.44%	77.59%	139.40%
Turnover Rank (percentile)	41st	47th	46th
Number of Family Obs.	159	194	385

**Table VI. The Determinants of New Fund Opening**

Table VI provides the regression coefficients from a multinomial probit analysis of the decision of whether or not to open a new fund. The unit of observation is fund family-investment objective-year and the dependent variable is 1 if the fund family added a new fund in the given investment objective that year, 0 otherwise. Coefficients are jointly estimated for both the opening of a new incubated fund and a new non-incubated fund relative to the decision of not opening a new fund. Calendar year fixed effects are included and the standard errors are clustered by fund family. The first three columns of results are for the domestic equity sample analyzed throughout the paper and the last three columns are for a larger sample that also includes bond and international equity funds. The table lists the coefficient and whether or not it is significant (the asterisks denote statistical significance as follows: \*\*\* - significant at 0.1%, \*\* - significant at 1%, and \* - significant at 5%). The table also lists the p-value (in parentheses) of a difference test of the coefficients between the new incubated and non-incubated fund addition. The independent variables include an intercept, the dollar flow rank over the previous 12 months into the investment objective (Inv. Obj. Flow Rank), into the family overall (Family Flow Rank) and into the current family offerings in that specific investment objective (Family Inv. Obj. Flow Rank), the average return in excess of the investment objective average for the fund family overall (Avg. Family Excess Return), and the average return in excess of the investment objective average for the family's offerings in that particular investment objective (Family Inv. Obj. Excess Return). Also included are the log of the total net assets invested in the investment objective across families (Log(Inv. Obj. TNA)), the log of family total net assets (Log(Family TNA)), the percent of the family's assets in that investment objective (Percent Assets in Inv. Obj.), a dummy variable for whether or not a large fund family (95<sup>th</sup> percentile or above) opened a fund in that investment objective in the previous year, the percentage change in the total number of shareclasses available for the investment objective from the previous year (Inv. Obj. % Change in # of Share Classes Last Year) and the number of new funds (# of New Funds Opened Last Year) and the number of incubated funds (# of Incubated Funds Opened Last Year) opened by the fund family in the previous year. The last four variables included are the percent of the families' assets that are in institutional funds (Percent of Family TNA in Institutional Funds), a dummy variable for whether the majority of funds in the family have either a front or rear load (Load Fund Family ID), the average tenure for managers in the family (Avg. Manager Tenure) calculated from the set of current managers, and the percent of family TNA in index funds (Percent of Family TNA in Index Funds).

Variable	Non-incub. Coef.	Incubated Coef.	Diff. p-Value	Non-incub. Coef.	Incubated Coef.	Diff. p-Value
Intercept	-15.2 ***	-13.3 ***		-14.0 ***	-13.2 ***	
Inv. Obj. Flow Rank	0.961 ***	0.922 ***	0.893	0.922 ***	0.686 ***	0.233
Family Flow Rank	0.277 *	0.253	0.894	0.281 *	0.277	0.977
Family Inv. Obj. Flow Rank	-0.140	-0.342 **	0.081	-0.337 ***	-0.585 ***	0.016
Avg. Family Excess Return	0.737 *	0.518	0.683	1.456 ***	0.826	0.232
Family Inv. Obj. Excess Return	-1.217 ***	-1.426 **	0.542	-2.404 ***	-2.691 ***	0.398
Log(Inv. Obj. TNA)	0.640 ***	0.547 ***	0.187	0.531 ***	0.482 ***	0.332
Log(FamilyTNA)	0.444 ***	0.370 ***	0.023	0.432 ***	0.378 ***	0.099
Percent Assets in Inv. Obj.	0.006 ***	0.006 ***	0.731	0.006 ***	0.007 ***	0.283
Large Family Opened Fund in Inv. Obj.	1.147 **	0.666	0.405	1.351 ***	1.173 ***	0.622
Inv. Obj. % Change in # of Share Classes Last Year	0.001	-0.021 ***	0.002	0.006 ***	-0.010 *	0.000
# of New Funds Opened Last Year	0.005	0.005	0.780	0.004 *	0.002	0.455
# of Incubated Funds Opened Last Year	0.014	0.033 ***	0.002	0.006	0.030 ***	0.000
Percent of Family TNA in Institutional Funds	0.240	0.564 **	0.059	0.351 **	0.654 **	0.065
Load Fund Family ID	0.295 **	0.656 ***	0.004	0.177	0.668 ***	0.000
Avg. Manager Tenure	-0.122 ***	-0.135 **	0.758	-0.104 ***	-0.125 **	0.654
Percent of Family TNA in Index Funds	-0.061	-1.270	0.155	-0.002	-1.255	0.121
Total Number of Observations		52,344			102,449	
Non-Incubated Fund Additions		1,389			1,932	
Incubated Fund Additions		723			1,072	
Fund Families		738			738	
Pseudo R-squared		30.84%			28.48%	

**Table VII. The Impact of Incubation on Aggregate Fund Returns**

Table VII provides an overall comparison of mutual fund performance from 1996 to 2005 with and without the incubation period observations. The sample includes domestic equity funds where the ticker from CRSP was able to be matched with the ticker creation date data from 1996 to 2007. Including the additional two years (2006 and 2007) of ticker creation date data allows for those funds that were in incubation on or before 2005, but that were opened to the public in either 2006 or 2007 to be included in the analysis. If an incubated fund was opened to the public in 2008 or later, its performance will not be included in the analysis. For the entire period of 1996 to 2005 (Overall) and for each year, the table compares the performance of the entire sample (Full Sample) to the sample where all incubation period observations are removed (No Incub. Obs.). The performance measures are calculated from monthly return observations and the results are annualized. The performance measures calculated are a 4-factor alpha (Fama and French, 1993 and Carhart, 1997), an equally-weighted average return and a value-weighted average return for those observations with total net assets data. The 4-factor alpha is estimated using a pooled OLS approach. The table reports the total number of observations (Total Obs.) as well as the percentage of those observations that are from funds in incubation (% Obs. Incub.). The table also reports the p-value of the overall performance differences from the OLS estimates of the difference in coefficients for the 4-factor alpha and p-values for a t-test difference in coefficients for the equal-weighted and value-weighted average return.

			4-Factor Alpha			Annualized Total Returns Equal-Weighted Average			Value-Weighted Average		
	Total Obs.	% Obs. Incub.	Full Sample	No Incub. Obs.	Diff.	Full Sample	No Incub. Obs.	Diff.	Full Sample	No Incub. Obs.	Diff.
<b>1996</b>	7433	39.28%	1.77%	0.44%	1.33%	19.59%	18.11%	1.48%	18.95%	18.77%	0.18%
<b>1997</b>	10023	30.14%	-7.71%	-8.37%	0.66%	21.32%	20.37%	0.95%	20.90%	20.92%	-0.02%
<b>1998</b>	12967	25.22%	-2.37%	-3.57%	1.20%	16.80%	15.99%	0.81%	23.46%	23.90%	-0.44%
<b>1999</b>	15101	20.15%	3.63%	2.69%	0.94%	29.29%	28.88%	0.41%	36.90%	37.07%	-0.17%
<b>2000</b>	16939	17.25%	7.43%	6.39%	1.04%	-0.61%	-1.44%	0.83%	0.10%	-0.17%	0.27%
<b>2001</b>	18370	11.73%	-3.16%	-3.52%	0.36%	-10.40%	-10.68%	0.28%	-10.09%	-10.17%	0.08%
<b>2002</b>	18993	10.02%	-4.38%	-4.54%	0.16%	-24.18%	-24.38%	0.20%	-21.30%	-21.34%	0.04%
<b>2003</b>	18984	7.36%	-5.18%	-5.26%	0.08%	30.78%	30.82%	-0.04%	32.32%	32.27%	0.05%
<b>2004</b>	18970	7.03%	0.14%	0.12%	0.02%	12.44%	12.44%	0.00%	13.97%	13.97%	0.00%
<b>2005</b>	18230	7.04%	-0.30%	-0.26%	-0.04%	7.98%	8.06%	-0.08%	10.29%	10.31%	-0.02%
<b>Overall</b>	156010	14.90%	-1.16%	-1.59%	0.43%	8.49%	7.65%	0.84%	10.22%	10.11%	0.11%
<b>Diff.</b>											
<b>p-Value</b>				0.001			0.002			0.709	

**Table VIII. Net Flows and Performance—Full Sample versus Incubation Filtered Sample**

Table VIII contains the average coefficient from a Fama and Macbeth (1973) regression of annual net flows to a mutual fund on fund characteristics. The sample consists of U.S. domestic equity funds in the CRSP sample from 1998 to 2005. The cross-sectional regressions are monthly, and Newey West (1987) standard errors with 12 lags are calculated for the coefficients. Two different samples are run for each specification: the full sample (Full Sample) and the sample with the incubation period data removed (No Incubated). The independent variables include the previous year's fund size (Log(FundTNA)), contemporaneous annual flows to the fund's investment objective (InvObjFlow), the fund's expenses (TotalExp) calculated as the expense ratio plus the value-weighted fund load amortized over seven years, and the standard deviation of the fund's monthly returns (StdDev) calculated over the previous 12 months. Also included are fractional performance ranks using the fund's total return over the previous year (TotRet) and the fund's 1-Factor or Jensen's (1968) alpha (1-FactorAlpha). The performance measures are calculated as the fractional performance rank (i.e., the percentile rank of a fund's performance relative to all other funds in the sample for that date). Performance measures are separated into high (top or quintile 1), medium (middle or quintiles 2–4) and low (bottom or quintile 5) categories. The performance measures are calculated to give a piece-wise linear specification:  $TotRetRankLow = \min(0.2, TotRetRank)$ ,  $TotRetRankMed = \min(0.6, TotRetRank - TotRetRankLow)$ , and  $TotRetRankHigh = \min(0.2, TotRetRank - TotRetRankMed - TotRetRankLow)$ . The table reports the number of cross-sections from the Fama and Macbeth (1973) approach as well as the average number of observations per cross-section and the average adjusted  $R^2$  of the cross-sectional regressions.

Variable	Full Sample		No Incubated		p-Value	Full Sample		No Incubated		p-Value
	Estimate	t-stat	Estimate	t-stat	Coef. Diff.	Estimate	t-stat	Estimate	t-stat	Coef. Diff.
Intercept	0.50	3.33	0.49	3.15	0.98	0.47	2.63	0.49	2.55	0.58
Log(Fund TNA) <sub>i,t-1</sub>	-0.13	-7.59	-0.11	-6.43	0.01	-0.13	-7.71	-0.10	-6.78	0.01
InvObjFlow <sub>i,t</sub>	0.78	3.98	0.80	3.62	0.98	0.79	3.86	0.80	4.22	0.91
TotalExp <sub>i,t-1</sub>	0.10	0.03	-0.41	-0.19	0.45	-0.12	-0.04	-0.44	-0.20	0.49
StdDev <sub>i,t-1</sub>	-0.78	-0.29	-1.82	-0.81	0.44	1.21	0.44	-0.07	-0.03	0.40
TotRetRankLow <sub>i,t-1</sub>	0.26	1.00	0.37	1.08	0.47					
TotRetRankMed <sub>i,t-1</sub>	0.63	6.94	0.57	6.34	0.28					
TotRetRankHigh <sub>i,t-1</sub>	3.49	5.00	3.28	4.54	0.06					
1-FactorAlphaRankLow <sub>i,t-1</sub>						0.04	0.18	-0.01	-0.03	0.64
1-FactorAlphaRankMed <sub>i,t-1</sub>						0.66	6.19	0.61	5.25	0.06
1-FactorAlphaRankHigh <sub>i,t-1</sub>						3.10	4.62	2.85	4.47	0.10
No. of Cross-Sections	96		96			96		96		
Avg. # Obs. Per Cross-Section	681		615			681		615		
Average Adjusted R <sup>2</sup>	9.3%		8.8%			9.1%		8.6%		

**Table IX. Fund Size and Performance—Full Sample versus Incubation Filtered Sample**

Table IX contains the coefficients from a panel regression of fund performance on lagged-fund characteristics. The reported standard errors are clustered by fund and yearly fixed effects interacted with fund investment objective that are included in the regression. The sample consists of domestic equity funds from CRSP samples from 1998 to 2005. In columns 1 and 2 of the results, the 1-factor or Jensen's alpha (1968) is used as the performance measure. In columns 3 and 4 of the results, the 4-factor alpha (Fama and French, 1993 and Carhart, 1997) is used as the performance measure. The dependent variable is a performance measure that is calculated in the same manner as Chen, Hong, Huang and Kubik (2004). Specifically, the sample is separated into total net assets quintiles and pooling the cross-section and time-series of observations, a set of factor loadings is calculated for each quintile. The monthly 1 and 4-Factor alphas are calculated using these factor loadings. Two different samples are run for each specification: the full sample (Full Sample) and the sample with the incubation period data removed (No Incubated). The independent variables include the past performance over the previous 12 months and lagged values of the log of the fund's total net assets (Log(TNA)), the log of family total net assets (Log(Family TNA)), the fund's turnover ratio (Turnover), fund age in years (Age), the fund's expenses (Expenses), the share class value-weighted fund load (Load), fund flow over the previous year (Flow), and an intercept. The table also reports the total number of observations, the number of clusters, the p-value of a test of the equivalence of the size (Log(TNA)) coefficient across the Full Sample and the No Incubated sample, and the r-squared of the regression.

Variable	Full Sample		No Incubated		Full Sample		No Incubated	
	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat	Estimate	t-stat
Intercept	-0.056	-0.48	-0.112	-0.96	-0.179	-1.54	-0.249	-2.15
1-Factor Alpha <sub>i,t-1</sub>	0.013	12.61	0.011	9.33				
4-Factor Alpha <sub>i,t-1</sub>					0.015	14.64	0.013	10.82
Log(TNA <sub>i,t-1</sub> )	-0.069	-7.20	-0.059	-6.06	-0.054	-5.77	-0.042	-4.41
Log(Family TNA <sub>i,t-1</sub> )	0.011	1.75	0.012	1.86	0.011	1.87	0.012	2.01
Turnover <sub>i,t-1</sub>	-0.015	-2.36	-0.014	-2.16	-0.014	-2.33	-0.013	-2.09
Age <sub>i,t-1</sub>	0.017	2.63	0.021	3.20	0.018	2.73	0.021	3.26
Expenses <sub>i,t-1</sub>	-10.02	-3.41	-10.80	-3.72	-10.16	-3.53	-10.76	-3.74
Flow <sub>i,t-1</sub>	0.005	1.22	0.001	0.37	0.006	1.29	0.002	0.43
Load <sub>i,t-1</sub>	-0.501	-0.75	-0.561	-0.87	-0.482	-0.73	-0.572	-0.89
Number of Observations	77511		72369		77511		72369	
Number of Clusters	1395		1381		1395		1381	
P-Value Log(TNA) - Full vs. No Incubated			0.015				0.002	
Year*Invest.Obj. Fixed Effects	Yes		Yes		Yes		Yes	
R <sup>2</sup>	3.0%		2.7%		3.4%		3.1%	

**Table X. The Total Net Asset Filter and the Incubation Bias**

Table X provides descriptive statistics of various return measures for incubated and non-incubated funds. The mean, median, and asterisks that indicate the statistical significance of each value from a two-sided t-test and a sign test are reported. The table also reports the annualized difference between the mean and median values and asterisks that indicate the statistical significance of the differences from a two sample t-test and a non-parametric alternative, the Wilcoxon rank-sum test. The asterisks denote statistical significance as follows: \*\*\* - significant at 0.1%, \*\* - significant at 1%, and \* - significant at 5%. Five return measures are calculated: investment objective alpha, 4-factor alpha, 3-factor alpha, 1-factor alpha, and the total return. The statistics are given in units of percentage per month. The investment objective alpha is the fund average return less the average return for all funds with the same investment objective as identified by CRSP. The 1-factor alpha is Jensen's (1968) alpha. The 3-factor alpha uses the 3 factor model of Fama and French (1993). The 4-factor alpha combines the 3 Fama-French (1993) factors with a momentum factor (Carhart, 1997). The Sharpe ratio was first proposed by Sharpe (1966). Panel A. compares the incubation period performance of incubated funds to non-incubated funds. Panel B. applies a ticker creation date filter to the incubated data, removing all returns before the ticker creation date. Panel C. applies an age filter to both the incubated and non-incubated data, removing all returns of the funds for the first three years. Panel D divides the sample into two sections: those funds with total net assets after 36 months of greater than or equal to \$25 million and those funds with less than \$25 million.

Variable	Incubated		Non-Incubated		Annualized Difference in	
	Mean	Median	Mean	Median	Mean	Median
<b>Panel A - Unfiltered Data</b>	<b>(242 Funds)</b>		<b>(806 Funds)</b>			
Investment Obj. Alpha	0.29% ***	0.19% ***	0.08% **	0.06% *	2.40% ***	1.72% ***
4-Factor Alpha	0.35% ***	0.19% ***	0.06% *	-0.01%	3.47% ***	2.20% ***
3-Factor Alpha	0.36% ***	0.17% ***	0.07% *	-0.01%	3.46% ***	2.10% ***
1-Factor Alpha	0.23% ***	0.13% *	0.11% ***	0.04%	1.18%	1.30%
Total Return	1.44% ***	1.51% ***	0.62% ***	0.73% ***	9.37% ***	8.94% ***
<b>Panel B - Ticker Creation Date Filter</b>	<b>(242 Funds)</b>		<b>(806 Funds)</b>			
Investment Obj. Alpha	0.16% ***	0.08%	0.08% **	0.06% *	0.92%	0.21%
4-Factor Alpha	0.06%	-0.04%	0.06% *	-0.01%	0.03%	-0.36%
3-Factor Alpha	0.09% *	-0.03%	0.07% *	-0.01%	0.33%	-0.21%
1-Factor Alpha	0.36% ***	0.21% ***	0.11% ***	0.04%	2.93% ***	2.04% ***
Total Return	0.36% ***	0.38% ***	0.62% ***	0.73% ***	-3.17% **	-4.21% ***
<b>Panel C - Age Filter</b>	<b>(202 Funds)</b>		<b>(418 Funds)</b>			
Investment Obj. Alpha	-0.02%	-0.01%	0.01%	-0.02%	-0.40%	0.10%
4-Factor Alpha	-0.12% **	-0.10% ***	-0.14% ***	-0.13% ***	0.27%	0.35%
3-Factor Alpha	-0.12% **	-0.13% **	-0.13% ***	-0.13% ***	0.13%	0.07%
1-Factor Alpha	0.18% ***	0.11% *	0.14% ***	0.03%	0.44%	0.97%
Total Return	0.05%	0.19%	0.16% ***	0.20% ***	-1.37%	-0.08%
<b>Panel D - TNA Filter (\$25 Million)</b>						
<b>TNA ≥ \$25 Million</b>	<b>(129 Funds)</b>		<b>(609 Funds)</b>			
Investment Obj. Alpha	0.57% ***	0.45% ***	0.14% ***	0.12% ***	5.12% ***	3.95% ***
4-Factor Alpha	0.47% ***	0.27% ***	0.09% ***	0.03%	4.49% ***	2.94% ***
3-Factor Alpha	0.58% ***	0.29% ***	0.11% ***	0.03%	5.67% ***	3.07% ***
1-Factor Alpha	0.56% ***	0.43% ***	0.16% ***	0.09% **	4.80% ***	4.10% ***
Total Return	1.67% ***	1.49% ***	0.78% ***	0.83% ***	10.69% ***	7.92% ***
<b>TNA &lt; \$25 Million</b>	<b>(113 Funds)</b>		<b>(197 Funds)</b>			
Investment Obj. Alpha	0.08%	0.06%	-0.10%	-0.14% **	2.15% *	2.43% *
4-Factor Alpha	0.15% *	0.02%	-0.05%	-0.09% *	2.41% *	1.25% **
3-Factor Alpha	0.08%	-0.03%	-0.07%	-0.14% **	1.80%	1.24%
1-Factor Alpha	0.14%	0.01%	-0.03%	-0.10% *	2.04%	1.24%
Total Return	0.86% ***	0.84% ***	0.13%	0.33% *	8.65% ***	6.16% ***